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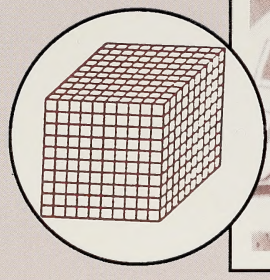
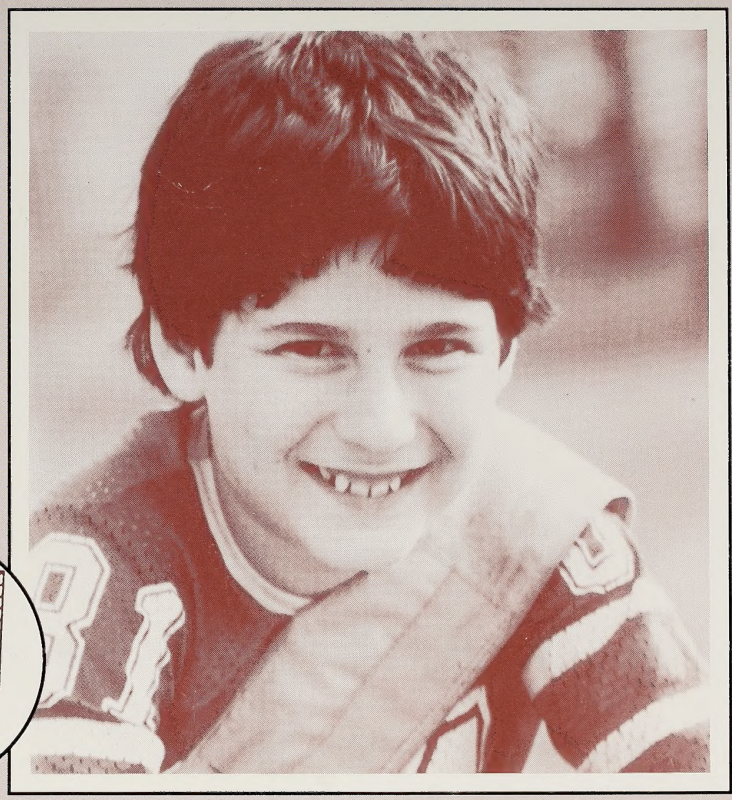
FRACTIONS and DECIMALS

MODULE 3





MATHEMATICS 7

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Mathematics 7

Module 3: Fractions and Decimals

MODULE BOOKLET

Mathematics 7
Student Module
Module 3
Fractions and Decimals
Alberta Distance Learning Centre
ISBN No. 0-7741-0163-6

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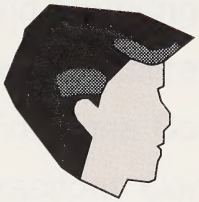
Welcome to Module 3!

We hope you'll enjoy your study of ***Fractions and Decimals*****.**

To make your learning a bit easier, a teacher will help guide you through the materials.

So whenever you see this icon,



turn on your audiocassette and listen.

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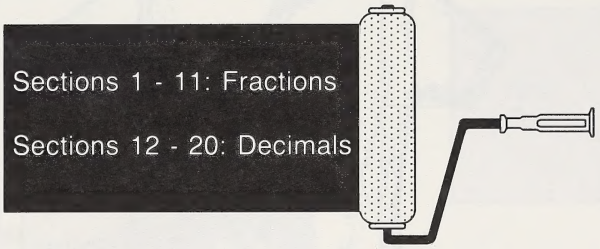
MODULE INTRODUCTION

What Lies Ahead

In this Module Introduction you will preview the components of Module 3 and discover how it will be evaluated.

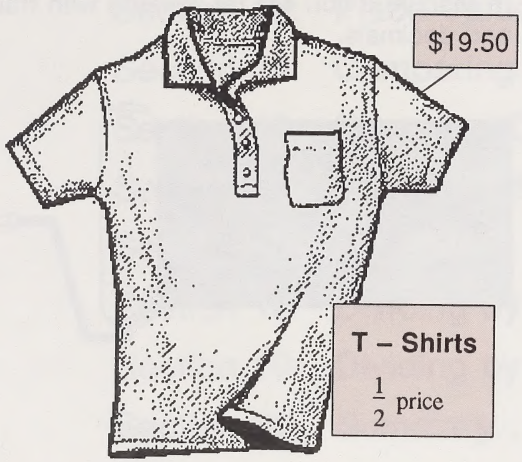
Working Together

In Module 3 you will be working with fractions and decimals.



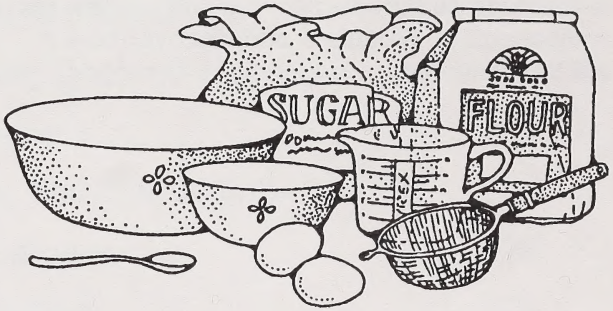
Fractions and decimal numbers are used in many everyday situations.

Example



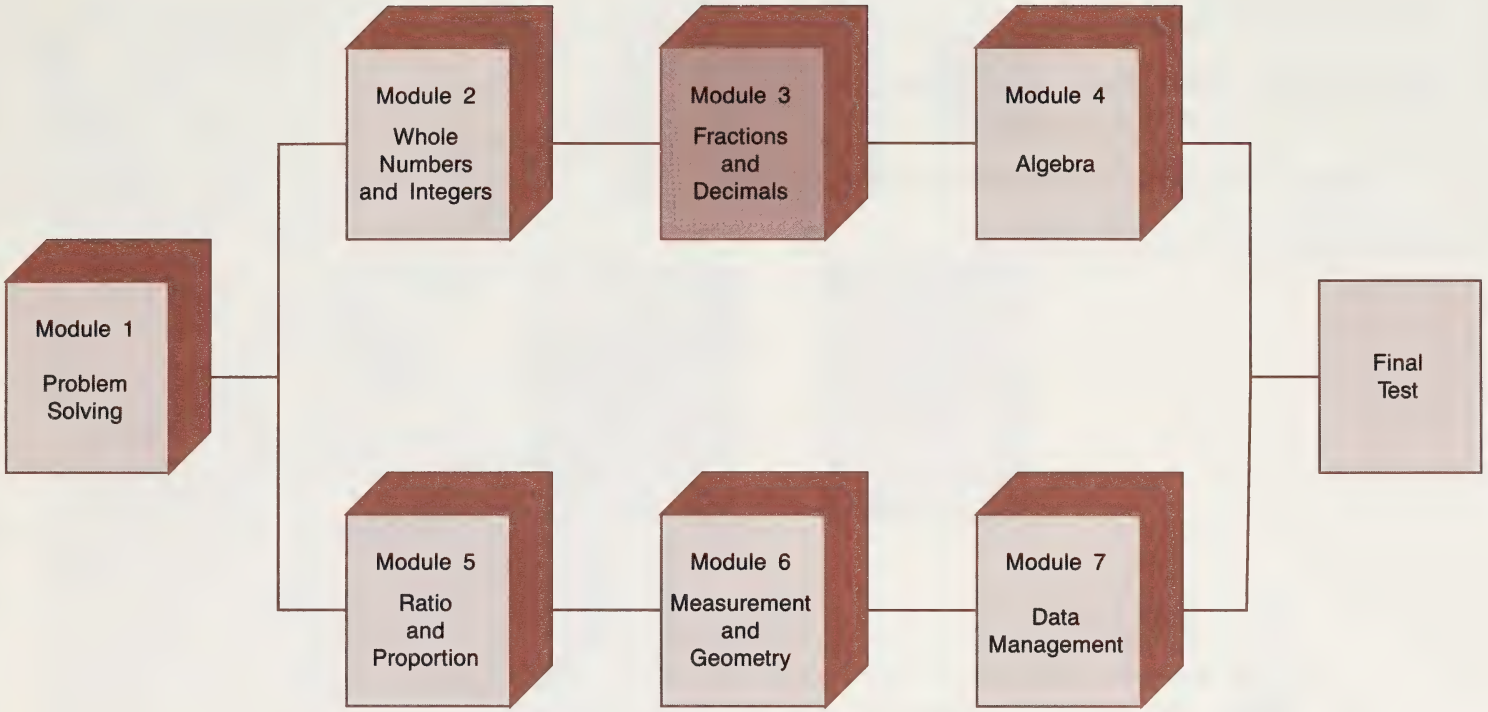
Fractions and decimal numbers are used in shopping.

Example



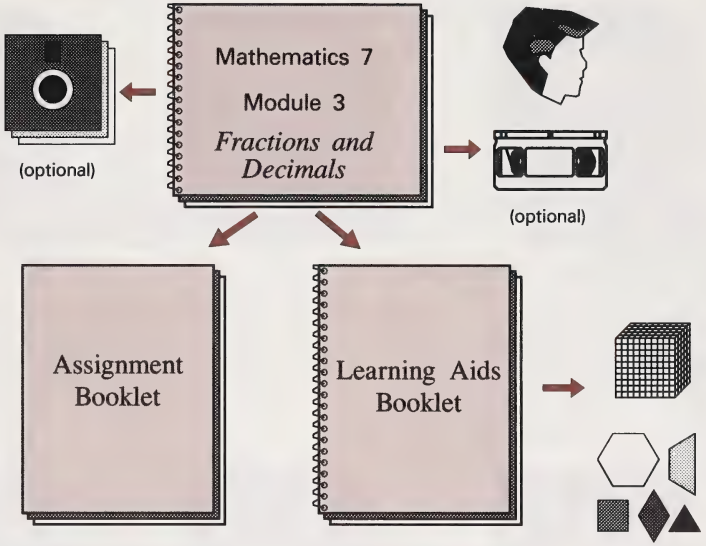
Fractions and decimal numbers are used in measuring.

Course Overview



Mathematics 7 has seven modules and a final supervised test. This module booklet is part of Module 3.

Module 3 Components



This module booklet will guide your learning and direct you to other components of the module. The video and computer activities in this booklet are optional. There are print alternatives. This module booklet is not to be submitted for a grade. Your learning facilitator will help you mark your answers.

Your mark on this module will be determined by your work in the assignment booklet.

Take time to preview this module booklet before beginning Section 1.

PART ONE

WESTFILE INC.

In Sections 1 - 11 you will be working with fractions.

Fractions are used in music. There are whole notes, half notes, quarter notes, and so on.

Fractions are also used in many other situations.

This part of the module should be very helpful to you in your everyday life.

What Lies Ahead

In this section you will test these skills.

- interpreting a fraction
- using multiplication and division to find equivalent fractions
- expressing fractions in simplest form
- expressing amounts as mixed numbers and fractions greater than 1
- expressing decimal numbers as fractions in simplest form
- expressing fractions as decimal numbers
- comparing and ordering fractions
- adding and subtracting fractions with common and different denominators
- multiplying and dividing fractions
- writing fractions in simplest form

Working Together

The pretest in this section will help you and your learning facilitator discover your strengths and weaknesses with fractions.

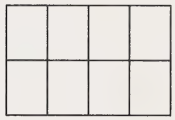
Pretest

Space for Your Work

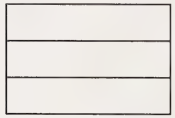
1. Colour each figure to show the fraction given.

a.

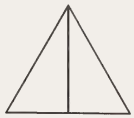
$\frac{1}{4}$

b. 

$\frac{7}{8}$

c. 

$\frac{2}{3}$

d. 

$\frac{1}{2}$

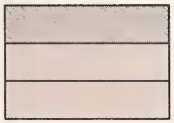
Space for Your Work

2. In each of the following what fraction of the figure is shaded?

a.

b.

c.

d. 

Space for Your Work

3. In each of the following give two equivalent fractions.

   a. $\frac{1}{3}$

   b. $\frac{3}{5}$

   c. $\frac{3}{4}$

   d. $\frac{2}{7}$

4. Express each of these in lowest terms

   a. 5 students as a fraction of a group of 25 students

   b. 30 minutes as a fraction 60 minutes

   c. 25¢ as a fraction of 100¢

   d. 13 cards as a fraction of a deck of 52 cards

Space for Your Work

5. Express each of these values as a mixed number.

   a. $\frac{20}{6}$

   b. $\frac{10}{3}$

   c. $\frac{25}{6}$

   d. $\frac{7}{5}$

6. Express each of these mixed numbers as a fraction.

   a. $1\frac{1}{2}$

   b. $2\frac{3}{10}$

   c. $3\frac{1}{3}$

   d. $4\frac{3}{4}$

Space for Your Work

7. Use $<$, $>$, or $=$ to make a true statement for each of these.

a. $\frac{3}{5}$ ◯ $\frac{2}{5}$

b. $\frac{1}{3}$ ◯ $\frac{1}{6}$

c. $\frac{3}{4}$ ◯ $\frac{4}{5}$

d. $\frac{2}{3}$ ◯ $\frac{4}{6}$

Space for Your Work

8. Express each of these as a decimal number.

   a. $\frac{1}{4}$

   b. $\frac{7}{10}$

   c. $1\frac{1}{5}$

   d. $2\frac{1}{2}$

9. Express each of these as a fraction in lowest terms.

   a. 0.8

   b. 0.75

   c. 1.8

   d. 0.04

Space for Your Work

10. Use $>$, $<$, or $=$ to make a true statement for each of the following.

a. $\frac{1}{3}$ ◯ 0.3

b. 1.25 ◯ $\frac{11}{8}$

c. $\frac{1}{10}$ ◯ 0.15

d. 0.2 ◯ $\frac{1}{5}$

Space for Your Work

11. For each of the following complete the diagram and write a number sentence.

a. and

→

→

Space for Your Work

b.

→

→

Space for Your Work

c. one half of

→

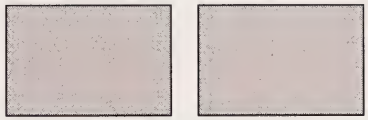
→

d. three-fourths of

→

Space for Your Work

e. How many are there in

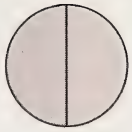


?

→

→

Space for Your Work

f. How many are there in  ?

→

→

Space for Your Work

g. How many are there in ?

→

See your learning facilitator to check your answers and to receive further instructions.

What Lies Ahead

In this section you will learn to interpret a fraction.

In this section you will use these words.

- fraction
- numerator
- denominator

Working Together

In this section you will learn the meaning of a fraction.

Learning Aids Activities

You will begin by investigating fractions using the pattern blocks.

Take out the pattern blocks and the *Learning Aids Booklet* and do Exercise A.

Working Together

As you learned from the Learning Aids Activities, a fraction may represent a part of a whole.

When a fraction represents a part of a whole, the top number shows the number of parts, and the bottom number tells the total number of parts in the whole.

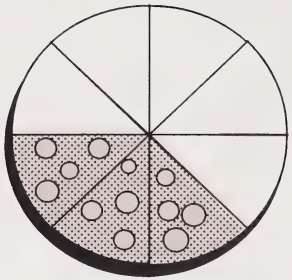
The top number is called the **numerator**.

The bottom number is called the **denominator**.

$$\frac{3 \leftarrow \text{numerator}}{8 \leftarrow \text{denominator}}$$

Example

What fraction of the whole pizza is left?



The number of slices eaten is 5.

The number of slices left is 3.

The number of slices in all is 8.

The fraction left is $\frac{3}{8}$.

The fraction is read as "three-eighths."

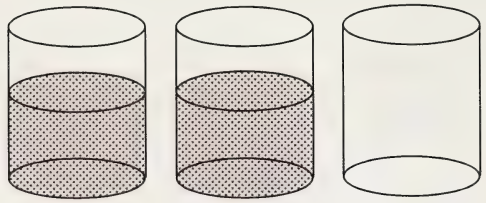
$\frac{3}{8}$ is a proper fraction. A **proper fraction** is a fraction whose numerator is less than its denominator.

Fractions may also represent parts of a group.

When a fraction represents a part of a whole, the numerator tells the number of parts, and the denominator tells the total number of parts in the group.

Example

What fraction of these glasses have juice in them?



The number of glasses with juice is 2.

The number of glasses without juice is 1.

The number of glasses in all is 3.

The fraction with juice is $\frac{2}{3}$.

The fraction is read as "two-thirds."

Note: $\frac{2}{3}$ is a proper fraction.

Fractions may also be used to express division.

When a fraction represents division, the numerator is the dividend, and the denominator is the divisor.

$$\frac{1 \leftarrow \text{dividend}}{5 \leftarrow \text{divisor}}$$

Example

A cake is divided equally among 5 people. What fraction of the cake does each person get?

Solution

One cake must be divided by five people.

Each person gets $\frac{1}{5}$ of the cake.

$$1 \div 5 = \frac{1}{5}$$

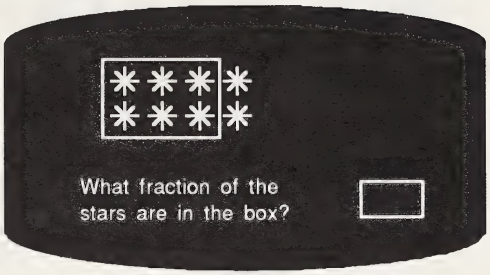
The fraction is read as "one-fifth."

Note: $\frac{1}{5}$ is a proper fraction.

Practice Activities

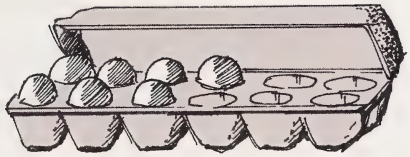
Computer Alternative

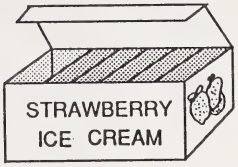
1. Do Program 1 (Fraction and Sets) on the *Fraction Factory* disk. To select this program press the space bar when this picture appears on the screen.

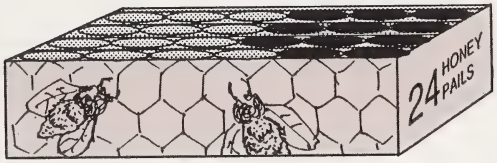


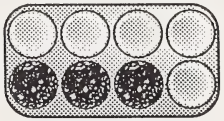
Space for Your Work

2. What fraction of each of these containers is full? What fraction of each of these containers is empty?

a. 

b. 

c. 

d. 

Space for Your Work

3. A pie is shared by 6 people. What fraction of the pie does each person get?

4. A bag of cookies is shared by seven people. What fraction of the bag of cookies does each person get?

5. The $1 000 000 lottery is split among 4 people. What fraction of the lottery does each person get?

See your learning facilitator to check your answers and to receive further instructions.

Concluding Activities

Space for Your Work

How can you cut a doughnut into eighths with three cuts of a knife. The pieces must be of equal size. [1]

See your learning facilitator to check your answers and to receive further instructions.

[1] *The Arithmetic Teacher,* May, 1987.

EQUIVALENT FRACTIONS

What Lies Ahead

In this section you will learn these skills.

- interpreting equivalent fractions
- using multiplication and division to find equivalent fractions
- expressing fractions in simplest form

In this section you will use these words.

- equivalent fractions
- simplest form
- basic fractions

Working Together

A fraction may have many different but equivalent forms as you will discover in this section.

Learning Aids Activities

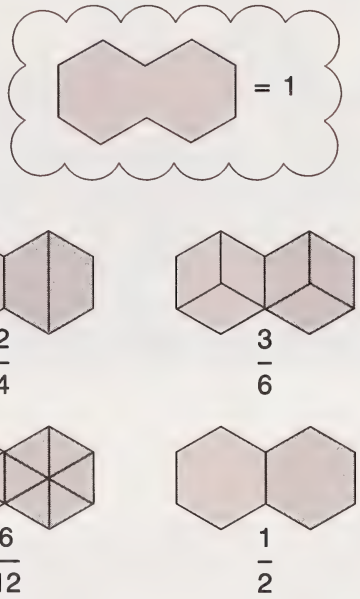
You will begin by using pattern blocks to understand the concept of equivalent fractions.

Turn to the *Learning Aids Booklet* and do Exercise B.

Working Together

As you discovered from the Learning Aids Activities, a fraction may have many different but equivalent forms.

Example



$\frac{2}{4} = \frac{3}{6} = \frac{6}{12} = \frac{1}{2}$

A fraction is in **simplest form** when it is written with the smallest denominator possible. A fraction in simplest form is also called a **basic fraction**.

The basic fraction for $\frac{2}{4}$, $\frac{3}{6}$ and $\frac{6}{12}$ is $\frac{1}{2}$.

An equivalent fraction can also be found by multiplying or dividing the numerator and the denominator by the same number.

Examples

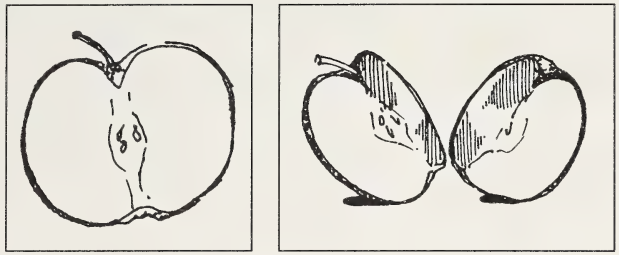
$$\frac{1}{2} \overset{\times 4}{=} \frac{4}{8} \qquad \frac{5}{10} \overset{\div 5}{=} \frac{1}{2}$$

Practice Activities

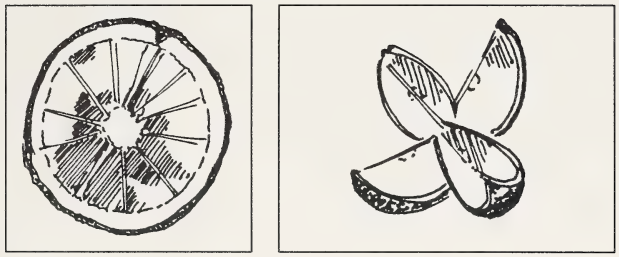
Space for Your Work

1. Write two equivalent fractions for each pair of pictures shown.

a.



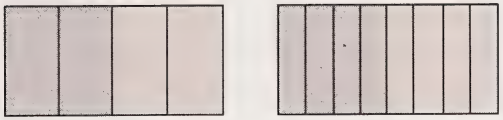
b.



c.

Space for Your Work

2. Write equivalent fractions for each pair of diagrams shown.

a. 

b.

c.

3. Give four equivalent fractions to describe the part of the clock shaded.

Space for Your Work

4. Complete so that you get equivalent fractions in each case.

   a. $\frac{1}{5} = \frac{\square}{25}$

   b. $\frac{12}{15} = \frac{\square}{5}$

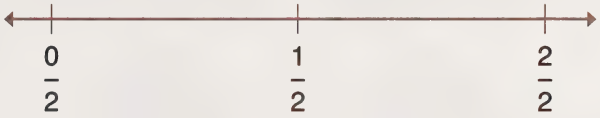
   c. $\frac{3}{8} = \frac{\square}{24}$

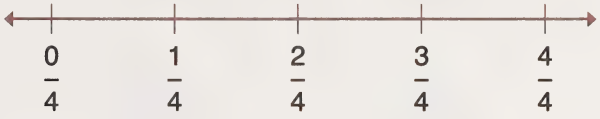
   d. $\frac{18}{12} = \frac{3}{\square}$

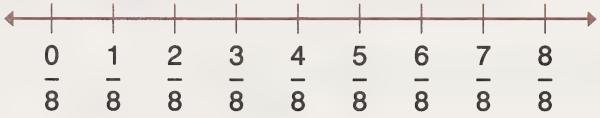
See your learning facilitator to check your answers and to receive further instructions.

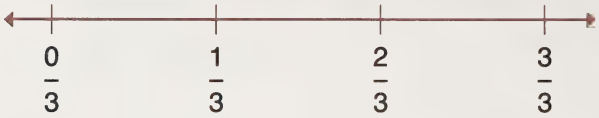
Working Together

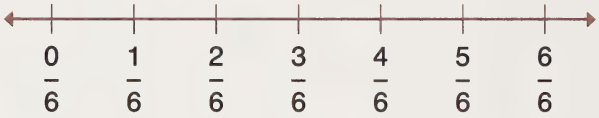
Numberlines are useful for finding equivalent fractions.

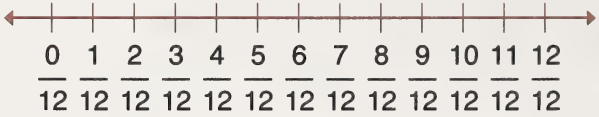






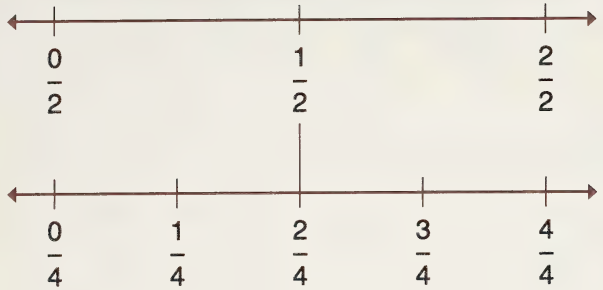






Example 1

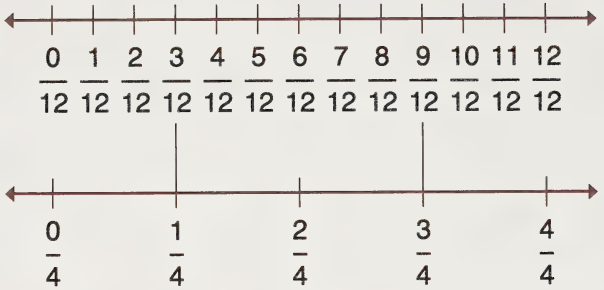
- Use the half line and the quarter line.



$\frac{1}{2} = \frac{2}{4}$

Example 2

- Use the twelfths line and the quarter line.



$\frac{3}{12} = \frac{1}{4}$

$\frac{9}{12} = \frac{3}{4}$

Multiple boards are useful for finding equivalent fractions.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50

Examples

- Use the 1 and 2 boards.

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12} = \frac{7}{14} = \frac{8}{16}$$

- Use the 2 and 3 boards.

$$\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12} = \frac{10}{15} = \frac{12}{18} = \frac{14}{21} = \frac{16}{24}$$

- Use the 1 and 4 boards.

$$\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16} = \frac{5}{20} = \frac{6}{24} = \frac{7}{28} = \frac{8}{32}$$

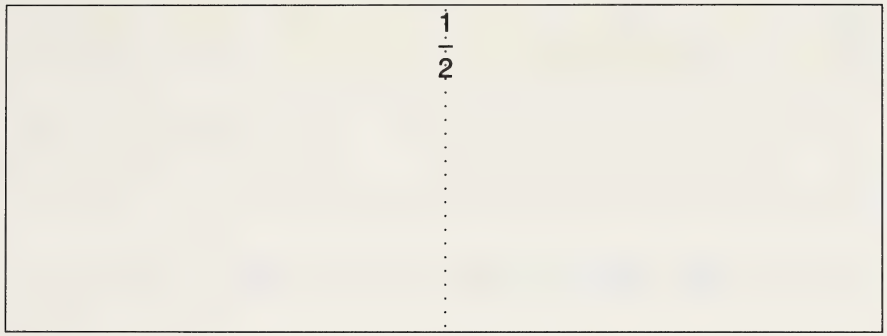
- Use the 2 and 5 boards.

$$\frac{2}{5} = \frac{4}{10} = \frac{6}{15} = \frac{8}{20} = \frac{10}{25} = \frac{12}{30} = \frac{14}{35} = \frac{16}{40}$$

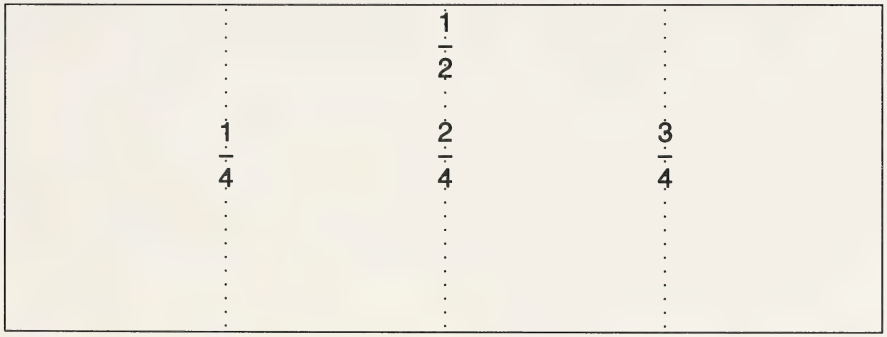
Extra Practice

1. Make number lines by folding paper.

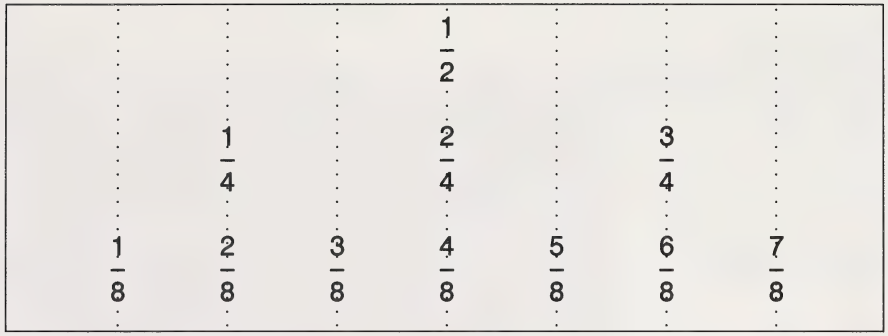
   a. Fold a piece of paper in half as shown and mark the folds.



   b. Fold the folded piece of paper in half again and mark the folds.



c. Fold the folded piece of paper in half again and mark the folds.



d. Using the paper you folded, give all the equivalent fractions for each of the following.

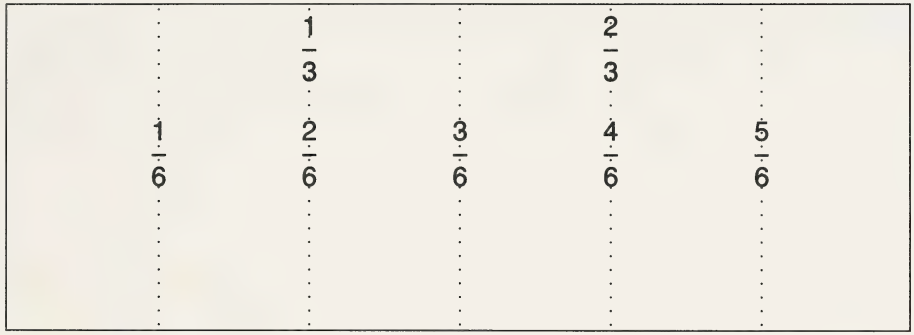
$\frac{1}{4}$ =

$\frac{1}{2}$ =

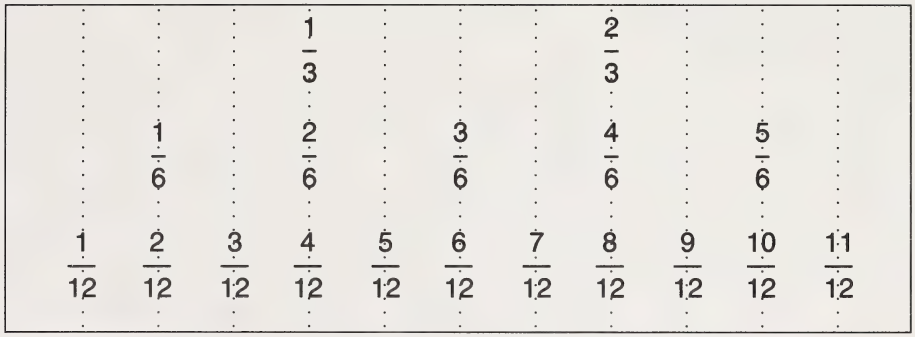
$\frac{3}{4}$ =

3. a. Fold a second piece of paper in thirds and mark the folds.

b. Fold the folded piece of paper in half and mark the folds.



c. Fold the folded piece of paper in half again and mark the folds.



d. Using the paper you folded, give all the equivalent fractions for each of the following.

$\frac{1}{6} =$ $\frac{2}{3} =$

$\frac{1}{3} =$ $\frac{5}{6} =$

$\frac{3}{6} =$

Space for Your Work

4. Cut out the multiple boards, found in the Appendix, at the end of this module booklet or make multiple boards out of popsicle sticks.

   Then give three equivalent fractions for each of the following.

   a. $\frac{1}{3}$

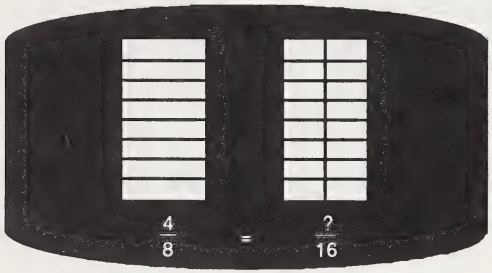
   b. $\frac{8}{10}$

   c. $\frac{8}{3}$

   d. $\frac{5}{1}$

Computer Alternative

5. Do Program 2 "Equivalent Fractions" on the *Fraction Factory* disk. To select this program press the space bar when this picture appears on the screen.

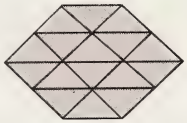


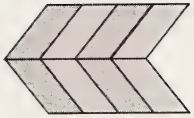
Do Lesson 4 on the "Fractions" disk from the *Computer Drill and Instruction: Mathematics, Level D* (*SRA*). Remember for this program if you make an error or need help, hold down the SHIFT key and press the ? key.

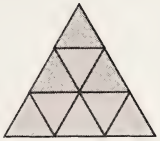
Print Alternative

Space for Your Work

6. Give two equivalent fractions that describe the shaded parts.

a. 

b. 

c. 

d.

Space for Your Work

7. Write three equivalent fractions for each of the following.

   a. $\frac{1}{4}$

   b. $\frac{2}{5}$

   c. $\frac{3}{6}$

   d. $\frac{1}{3}$

Space for Your Work

8. Complete each of the following.

a. $\frac{1}{3} = \frac{\square}{9}$

b. $\frac{12}{16} = \frac{3}{\square}$

c. $\frac{5}{8} = \frac{\square}{40}$

d. $\frac{12}{21} = \frac{4}{\square}$

See your learning facilitator to check your answers and to receive further instructions.

Working Together

A fraction is in lowest terms when the denominator is as small a whole number as possible.

Here is one way to write a fraction in lowest terms.

$$\frac{42}{56} \overset{\div 14}{=} \frac{3}{4}$$

Here is another way to write the fraction in lowest terms. Write the numerator and denominator as a product of prime factors, divide by the common factors, and multiply the factors in the numerator and in the denominator.

Example

$$\frac{42}{56} = \frac{\overset{1}{\cancel{2}} \times 3 \times \overset{1}{\cancel{7}}}{\underset{1}{\cancel{2}} \times 2 \times 2 \times \underset{1}{\cancel{7}}}$$

$$= \frac{3}{4}$$

$$\frac{2}{2} \overset{\div 2}{=} \frac{1}{1} \qquad \frac{7}{7} \overset{\div 7}{=} \frac{1}{1}$$

Concluding Activities

Space for Your Work

Write the following fractions in lowest terms using the prime-factors method.

1. $\frac{6}{15}$

2. $\frac{18}{24}$

3. $\frac{15}{36}$

4. $\frac{36}{42}$

5. $\frac{42}{60}$

6. $\frac{60}{70}$

See your learning facilitator to check your answers and to receive further instructions.

What Lies Ahead

In this section you will learn these skills.

- expressing amounts greater than 1 in fraction form
- expressing amounts greater than 1 in mixed number form.

In this section you will use these words.

- mixed number
- improper fraction

Working Together

In this section you will examine fractions greater than 1.

Learning Aids Activities

Turn to Exercise C in the *Learning Aids Booklet* and use the pattern blocks to investigate fractions greater than 1.

Working Together

As you learned from the Learning Aids Activities, a fraction greater than 1 may be expressed in fraction form or as a mixed number.

Study these examples.

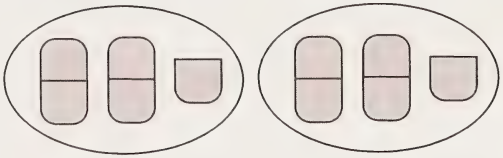
Example 1

How can you share 5 chocolate bars with your friend?

Method 1

You could divide all the bars into halves.

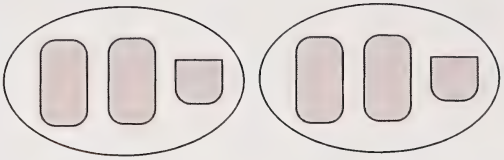
Each of you would get 5 half bars, or $\frac{5}{2}$ bars.



Method 2

You could divide one bar into two equal parts.

Each of you would get two whole bars and a half bar, or $2\frac{1}{2}$ bars.



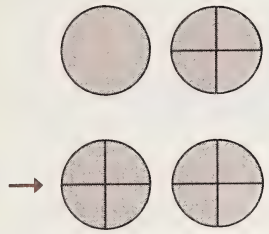
Note: $\frac{5}{2} = 2\frac{1}{2}$

The fraction form is $\frac{5}{2}$. The mixed number form is $2\frac{1}{2}$.

$\frac{5}{2}$ is an improper fraction. An **improper fraction** is a fraction whose numerator is greater than its denominator.

Example 2

Express $1\frac{3}{4}$ as a fraction.



$$1 + \frac{3}{4}$$

$$= \frac{4}{4} + \frac{3}{4}$$

$$= \frac{7}{4}$$

Here is another way to do this:

$$1\frac{3}{4} = \frac{(1 \times 4) + 3}{4}$$

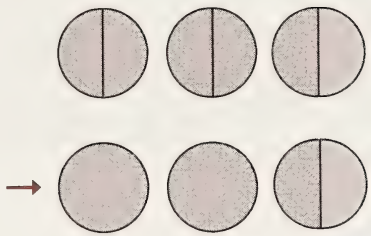
$$= \frac{4 + 3}{4}$$

$$= \frac{7}{4}$$

So $1\frac{3}{4} = \frac{7}{4}$

Example 3

Express $\frac{5}{2}$ as a mixed number.



$$\frac{5}{2}$$

$$= 2 + \frac{1}{2}$$

$$= 2\frac{1}{2}$$

Here is another way to do this:

$\frac{5}{2}$ means 5 divided by 2.

$$2\overline{)5}\ \begin{matrix}2\ \text{R1} \\ \frac{4}{1}\end{matrix}$$

2 wholes, $\frac{1}{2}$ remaining

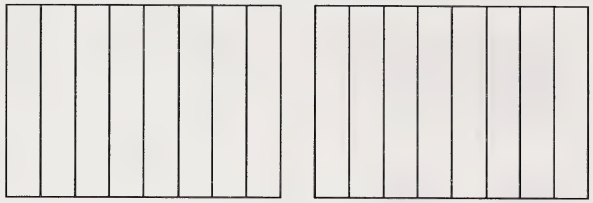
So $\frac{5}{2} = 2\frac{1}{2}$.

Practice Activities

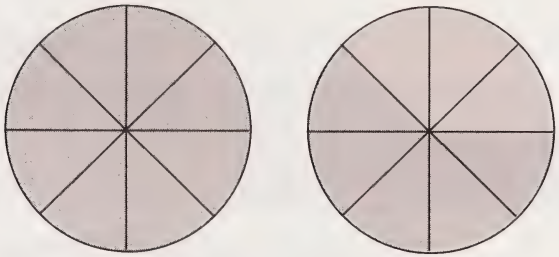
Space for Your Work

1. Colour $\frac{12}{8}$ of the rectangle on the right.

1.



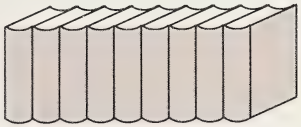
2. What fraction is shaded?



3. Eddie made 12 muffins using two 8-muffin trays. What fraction of the two trays did he use?

Space for Your Work

4. Linda ordered 8 books. She received 9 books. What fraction of her books did she receive?



5. What fraction of a full turn does the second hand on a watch make in 140 seconds?

6. Express each mixed number as an improper fraction.

   a. $2\frac{1}{3}$

   b. $1\frac{1}{4}$

   c. $3\frac{1}{2}$

   d. $5\frac{3}{10}$

Space for Your Work

7. Express each of these improper fractions as a mixed number.

   a. $\frac{11}{8}$

   b. $\frac{14}{5}$

   c. $\frac{15}{11}$

   d. $\frac{22}{7}$

Space for Your Work

8. Express each of these improper fractions as a mixed number in lowest terms.

   a. $\frac{8}{6}$

   b. $\frac{20}{12}$

   c. $\frac{30}{8}$

   d. $\frac{36}{10}$

See your learning facilitator to check your answers and to receive further instructions.

Extra Practice

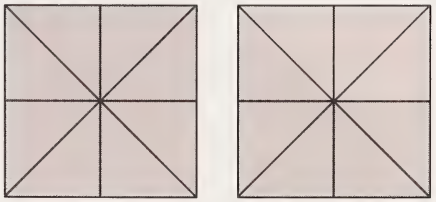
Computer Alternative

1. Do Lessons 1, 2, and 3 on the "Fraction" disk of *Computer Drill and Instruction: Mathematics, Level D* (*SRA*). Remember if you need help or have an error hold down the SHIFT key and press the ? key.

Print Alternative

2. Shade $\frac{11}{8}$ of the circles at the right.

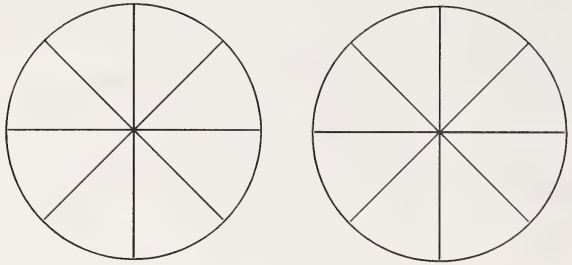
3. What fraction of these squares are shaded? Use the improper fraction form.



4. Express the fractions in Questions 2 and 3 as mixed numbers.

Space for Your Work

2.



Space for Your Work

5. Express each of these improper fractions as a mixed number.

   a. $\frac{13}{5}$

   b. $\frac{22}{3}$

   c. $\frac{27}{4}$

   d. $\frac{15}{8}$

Space for Your Work

6. Express each of these mixed numbers as an improper fraction.

   a. $1\frac{1}{2}$

   b. $2\frac{3}{4}$

   c. $3\frac{1}{3}$

   d. $4\frac{7}{8}$

Space for Your Work

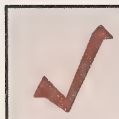
7. Express each of these improper fractions as a mixed number in lowest terms.

   a. $\frac{20}{6}$

   b. $\frac{45}{25}$

   c. $\frac{84}{20}$

   d. $\frac{36}{8}$



See your learning facilitator to check your answers and to receive further instructions.

Concluding Activities

Space for Your Work

There are 16 slices of bread in one loaf of bread.

1. How many slices are there in $2\frac{1}{4}$ loaves?

2. How many peanut butter sandwiches can be made from $2\frac{1}{4}$ loaves?

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See your learning facilitator to check your answers and to receive further instructions.

What Lies Ahead

In this section you will learn these skills.

- expressing decimal numbers as fractions in simplest form
- expressing fractions as decimal numbers

In this section you will use these words.

- repeating decimal number
- terminating decimal number

Working Together

Numbers have many different but equivalent forms. In this section you will learn to express a decimal number as a fraction in simplest form. You will also learn to change a fraction to a decimal number.

Video Activity

Watch *MATH WORKS: Relating Decimals and Fractions* and read the examples in this section.

If you cannot view the video, continue reading.

Expressing Decimal Numbers as Fractions

Decimal numbers can be expressed as fractions.

Example 1

Anita took 0.25 h to knit a square of her afghan. Express the time as a fraction in its simplest form.

Solution

Use a place value chart to help you.

hundreds	tens	ones	•	tenths	hundredths	thousandths
		0	•	2	5	

0.25 means 25 hundredths.

You can also use this mental reminder.

0.25 → 2 decimal places

$\frac{25}{100}$ → 2 zeros

$$0.25 = \frac{25}{100}$$

$$= \frac{1}{4} \leftarrow \text{simplest form}$$

Anita took $\frac{1}{4}$ h to knit a square of her afghan.

Expressing Fractions as Decimal Numbers

A fraction can be expressed as a decimal number.

Example 1

Polly the parrot eats $\frac{2}{3}$ of an apple every day.

Express the fraction as a decimal number rounded to the nearest tenth.

Method 1: Long Division

$\frac{2}{3}$ can mean 2 ÷ 3.

$$3\overline{)2.000}\quad 0.666$$

$$\begin{array}{r} 18 \\ \hline 20 \\ 18 \\ \hline 20 \\ 18 \\ \hline 2 \end{array}$$

$\frac{2}{3} = 0.666\ldots$

The three dots mean the same pattern continues on without end.

$\doteq 0.7$

Round to the nearest tenth.

The parrot eats about 0.7 apples every day.

Method 2: Using a calculator

$\frac{2}{3}$ can mean 2 ÷ 3.

Key Press	Display
2 ÷ 3 =	0.6666666

$0.666\ldots \doteq 0.7$ Round to the nearest tenth.

The parrot eats about 0.7 apples every day.

Note: Decimal numbers that continue with the same pattern and do not end are called repeating decimal numbers.

Example 2

Polly the parrot eats $\frac{1}{2}$ a cracker every day.

Express the fraction as a decimal number.

Method 1: Long Division

$\frac{1}{2}$ can mean $1 \div 2$.

$$2\overline{)1.0}\quad 0.5$$

$$\underline{10}$$

$$0$$

So $\frac{1}{2} = 0.5$.

The parrot eats 0.5 crackers every day.

Method 2: Using a calculator

Key Press	Display
1 ÷ 2 =	0.5

The parrot eats 0.5 crackers every day.

Method 3: Finding equivalent fractions with denominators of 10, 100, 1000, . . .

$$\frac{1}{2} \overset{\times 5}{=} \frac{5}{10}$$

$$= 0.5$$

The parrot eats 0.5 crackers every day.

Note: Decimal numbers that end are called **terminating decimals**.

Practice Activities

Space for Your Work

1. Express each of these decimal numbers as a fraction or a mixed number in lowest terms.

   a. 0.8

   b. 0.5

   c. 0.75

   d. 3.25

2. Express each of these fractions as a decimal number.

   a. $\frac{3}{10}$

   b. $\frac{3}{4}$

   c. $\frac{5}{8}$

Space for Your Work

d. $1\frac{3}{5}$

e. $\frac{2}{3}$

f. $\frac{4}{9}$

g. $\frac{6}{11}$

h. $1\frac{1}{6}$

Space for Your Work

3. Express each of the following as a fraction or as a mixed number in lowest terms.

   a. 0.7

   b. 0.6

   c. 0.25

   d. 1.3

   e. 2.8

   f. 4.05

   g. 0.375

   h. 3.125

See your learning facilitator to check your answers and to receive further instructions.

Extra Practice

Space for Your Work

Computer Alternative

1. Do Lessons 2 and 6 of the "Decimal" disk from the package *Computer Drill and Instruction: Mathematics, Level D* (*SRA*). If you need help or have an error, remember to hold down the SHIFT key and press the ? key.

Print Alternative

2. Express each of these fractions as a decimal number.

   a. $\frac{3}{10}$

   b. $\frac{2}{5}$

Space for Your Work

c. $\frac{7}{8}$

d. $\frac{3}{7}$

3. Express as a fraction in lowest terms.

   a. 0.2

   b. 0.25

   c. 0.85

   d. 1.7

See your learning facilitator to check your answers and to receive further instructions.

Concluding Activities

Cut out the squares of the Fraction Puzzle at the end of the booklet. Fit them together so that the edges touch the same number. [1]

See your learning facilitator to check your answers and to receive further instructions.

[1] *Ideas from the Arithmetic Teacher,* page 49.

COMPARING AND ORDERING FRACTIONS

What Lies Ahead

In this section you will learn to compare and order fractions.

In this section you will use these words.

- common denominator
- compare
- order

Working Together

In this section you will be comparing and ordering fractions.

Learning Aids Activities

You will begin by using pattern blocks.

Turn to the *Learning Aids Booklet* and do Exercise D.

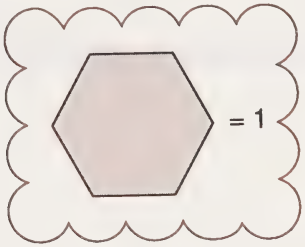
Working Together

Let's summarize what you have learned from the Learning Aids Activities.

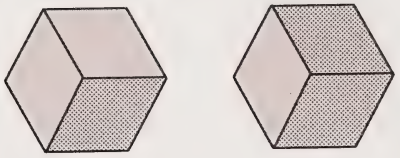
Comparing Fractions with the Same Denominators

Fractions with the same denominators can easily be compared.

Example Which is more, $\frac{1}{3}$ or $\frac{2}{3}$?



Solution



$\frac{1}{3}$ $\frac{2}{3}$

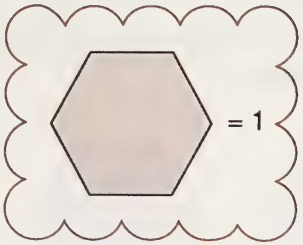
So $\frac{2}{3} > \frac{1}{3}$.

Note: When the denominators are the same, the fraction with the larger numerator is greater in value.

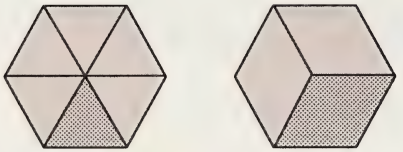
Comparing Fractions with the Same Numerators

Fractions with the same numerators can easily be compared.

Example Which is more, $\frac{1}{6}$ or $\frac{1}{3}$?



Solution



$\frac{1}{6}$ $\frac{1}{3}$

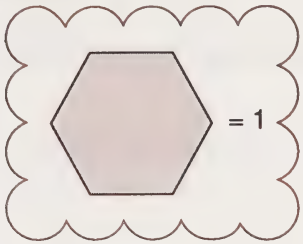
So $\frac{1}{3} > \frac{1}{6}$.

Note: When the numerators are the same, the fraction with the smaller denominator is greater in value.

Comparing Fractions with Different Numerators and Denominators

When the denominators and numerators are different, it is more difficult to compare them.

Example Which is less $\frac{1}{6}$ or $\frac{2}{3}$?



Solution

$\frac{1}{6}$ $\frac{2}{3}$

Express fractions with common denominators so they will be easier to compare.

$\frac{1}{6}$ $\frac{4}{6}$

So $\frac{1}{6} < \frac{4}{6}$

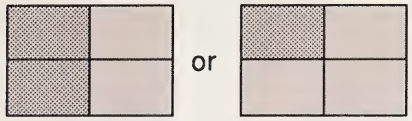
and $\frac{1}{6} < \frac{2}{3}$.

Practice Activities

Space for Your Work

In each of the following compare the pair of fractions.

1. Which is more?

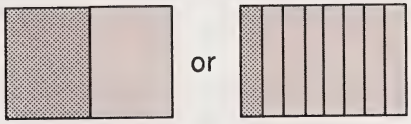
a.  or

$\frac{2}{4}$ $\frac{1}{4}$

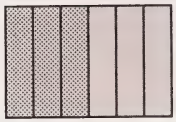
b. or

$\frac{3}{8}$ $\frac{1}{8}$

Space for Your Work

c.  or

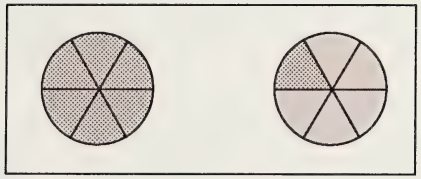
$\frac{1}{2}$ $\frac{1}{8}$

d.  or

$\frac{3}{6}$ $\frac{3}{4}$

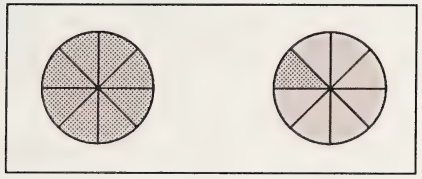
Space for Your Work

e.



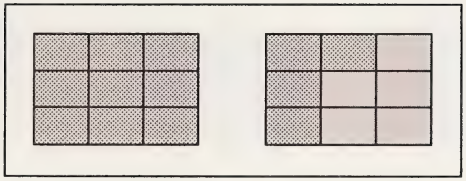
$\frac{7}{6}$

or



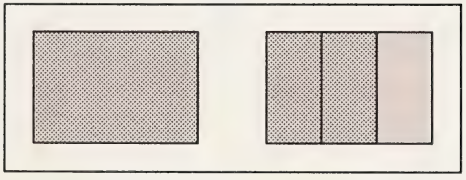
$\frac{9}{8}$

f.



$\frac{13}{9}$

or



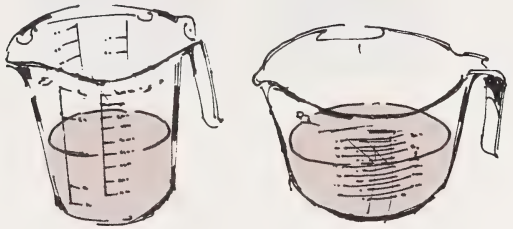
$1\frac{2}{3}$

Space for Your Work

2. Three pies of the same size are cut differently. Each pie has some pieces missing.

Which pie has the most left?

3. In the following photograph both pitchers hold 1L. The taller pitcher is $\frac{1}{2}$ full. The shorter pitcher is $\frac{3}{5}$ full.



Which pitcher contains more?

See your learning facilitator to check your answers and to receive further instructions.

Extra Practice

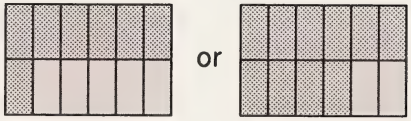
Space for Your Work

Computer Alternative

1. Do Programs 1 and 2 (Like Denominators, Like Numerators) on the *Growgin's Fractions* disk.

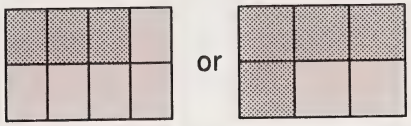
Print Alternative

2. Circle the smaller of the fractions in each pair.

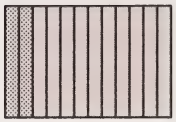
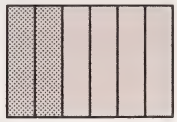
   a.  or

   $\frac{7}{12}$ $\frac{10}{12}$

Space for Your Work

b.  or

$\frac{3}{8}$ $\frac{4}{6}$

c.  or 

$\frac{2}{10}$ $\frac{2}{6}$

See your learning facilitator to check your answers and to receive further instructions.

Working Together

Fractions can have many different but equivalent forms.

This is helpful when you are comparing fractions with different numerators and denominators.

Example 1

Compare $\frac{1}{2}$ and $\frac{2}{3}$.

Solution

Rewrite the fractions so they have the same denominator.

$$\frac{1}{2} \overset{\times 3}{=} \frac{3}{6} \qquad \frac{2}{3} \overset{\times 2}{=} \frac{4}{6}$$

Since $\frac{3}{6} < \frac{4}{6}$,

then $\frac{1}{2} < \frac{2}{3}$.

Example 2

Compare 0.8 and $\frac{3}{5}$.

Solution

Rewrite the numbers as fractions with the same denominator.

$$0.8 = \frac{8}{10} \qquad \frac{3}{5} \overset{\times 2}{=} \frac{6}{10}$$

Since $\frac{8}{10} > \frac{6}{10}$,

then $0.8 > \frac{3}{5}$.

Concluding Activities

Space for Your Work

1. Which is more?

   a. $\frac{1}{3}$ or $\frac{1}{2}$

   b. $\frac{5}{6}$ or $\frac{1}{6}$

   c. $\frac{1}{2}$ or $\frac{3}{4}$

   d. $\frac{3}{5}$ or $\frac{7}{10}$

   e. 0.9 or $\frac{1}{2}$

   f. 3.2 or $3\frac{1}{5}$

Space for Your Work

2. Arrange these fractions and mixed numbers from least to greatest.

   a. $\frac{1}{2}, \frac{2}{3}, \frac{1}{4}, \frac{5}{8}$

   b. $\frac{1}{2}, 1\frac{3}{4}, \frac{7}{8}, \frac{7}{10}$

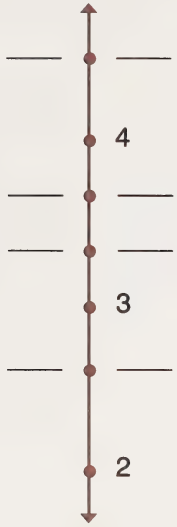
Computer Alternative

3. Do "Fraction Duet" on Disk B of *MAC 6.* Read the instructions in the folder with the disk before using the program.

Space for Your Work

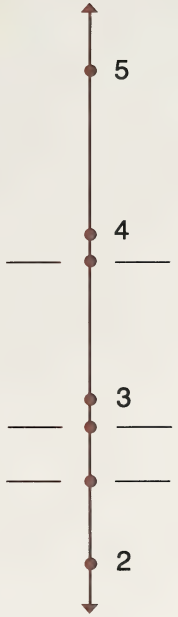
4. Estimate the points on the number lines. Decimals are written on the left of the number lines. Fractions are on the right of the number lines.

a.



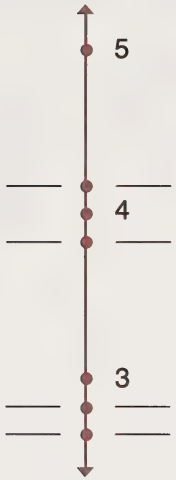
Space for Your Work

b.



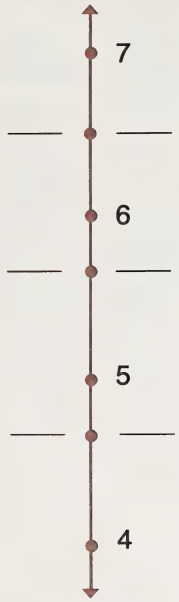
Space for Your Work

c.



Space for Your Work

d.



See your learning facilitator to check your answers and to receive further instructions.

ADDING FRACTIONS CONCRETELY

What Lies Ahead

In this section you will learn these skills.

- using learning aids and diagrams to add fractions with common and different denominators
- writing sums of fractions in simplest form

Working Together

In this section you will be adding fractions.

Learning Aids Activities

You will begin by using pattern blocks.

Turn to the *Learning Aids Booklet* and do Exercise E.

Working Together

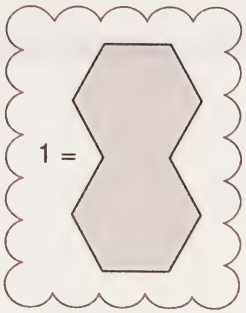
In the Learning Aids Activities, you examined adding fractions with the same denominator and adding fractions with different denominators.

The examples in this section summarize what you learned in the Learning Aids Activities.

Adding Fractions With Common Denominators

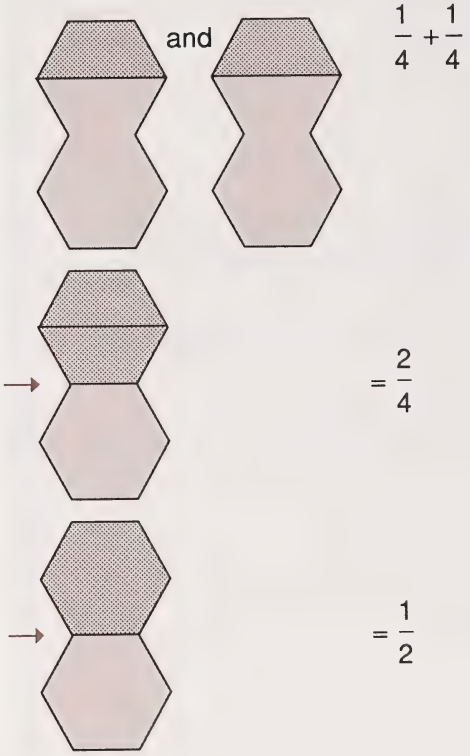
Fractions can easily be added if they have common denominators.

Example



What is $\frac{1}{4} + \frac{1}{4}$?

Solution

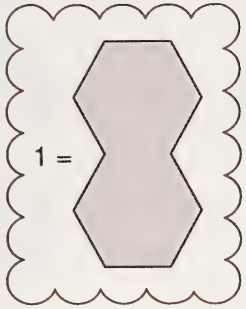


So $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$.

Adding Fractions With Different Denominators

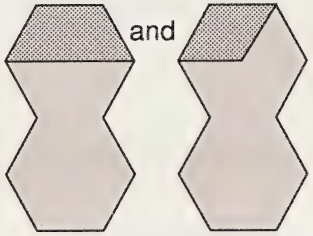
Fractions with different denominators are more difficult to add.

Example

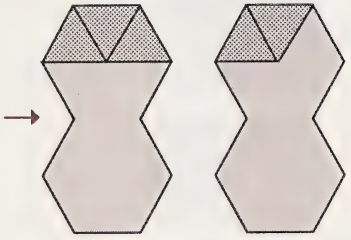


What is $\frac{1}{4} + \frac{1}{6}$?

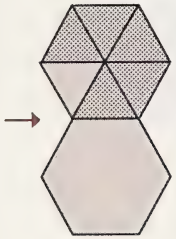
Solution



$\frac{1}{4} + \frac{1}{6}$



$= \frac{3}{12} + \frac{2}{12}$



$= \frac{5}{12}$

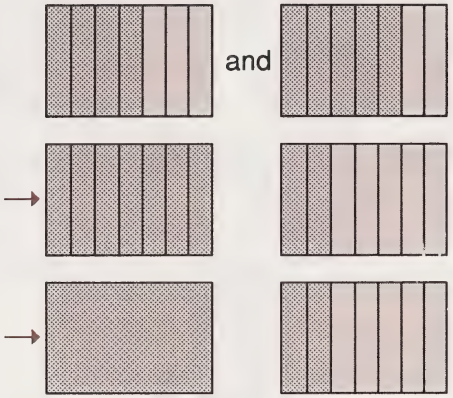
So $\frac{1}{4} + \frac{1}{6} = \frac{5}{12}$.

Describing Diagrams

You can write number sentences to describe diagrams of fractions.

Example 1

Write a number sentence to describe the following.



Solution

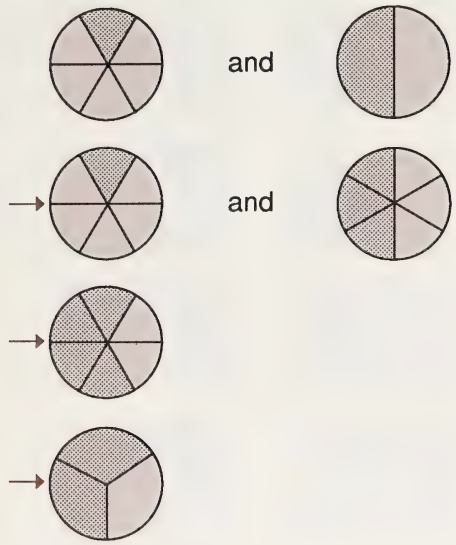
$$\frac{4}{7} + \frac{5}{7}$$

$$= \frac{9}{7}$$

$$= 1\frac{2}{7}$$

Example 2

Write a number sentence to describe the following.



Solution

$$\frac{1}{6} + \frac{1}{2}$$

$$= \frac{1}{6} + \frac{3}{6}$$

$$= \frac{4}{6}$$

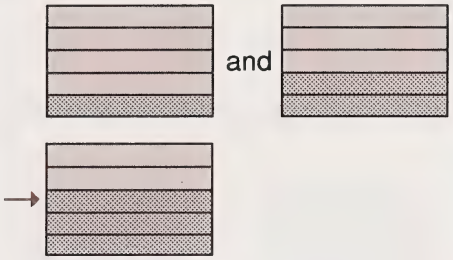
$$= \frac{2}{3}$$

Practice Activities

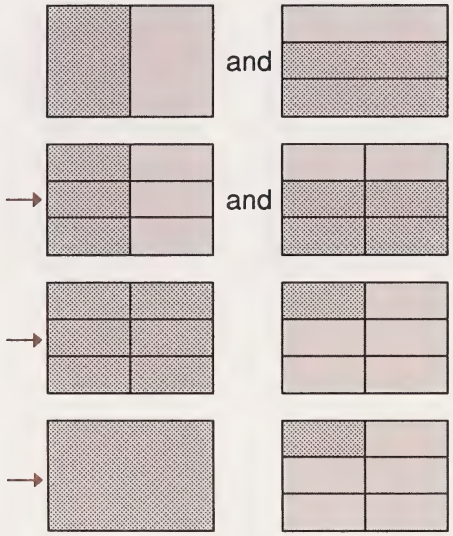
Space for Your Work

1. Write a number sentence to describe the following.

a.

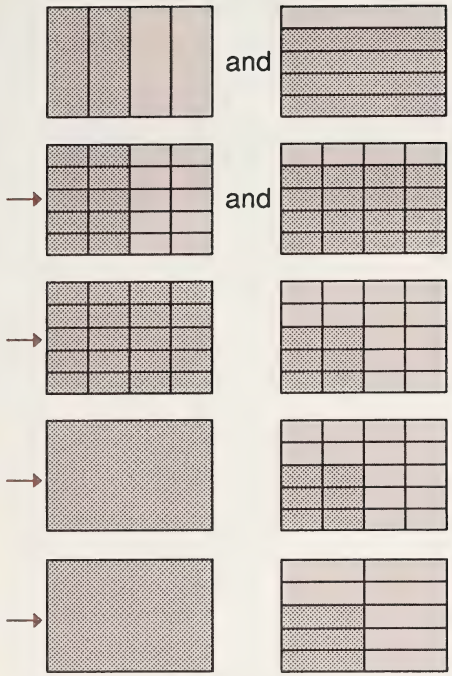


b.



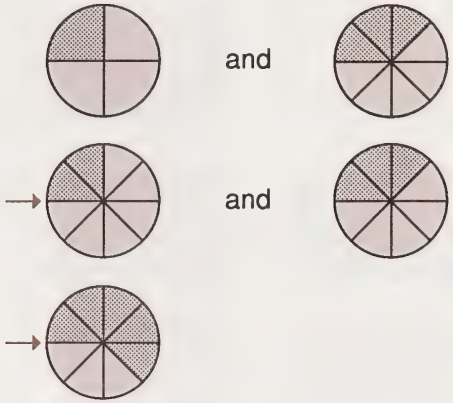
Space for Your Work

c.



Space for Your Work

2. Ruth made two pizzas for her family. She cut one pizza into fourths and the other pizza into eighths. Some of the pieces of each pizza were eaten. Write a number sentence to describe how many pieces remained.



Space for Your Work

3. Complete the following diagrams and write a number sentence to show each of the following.

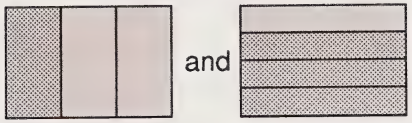
   a. and

   →

   →

   →

Space for Your Work

b.  and

→

→

→

Space for Your Work

Use pattern blocks, or diagrams to solve the following.

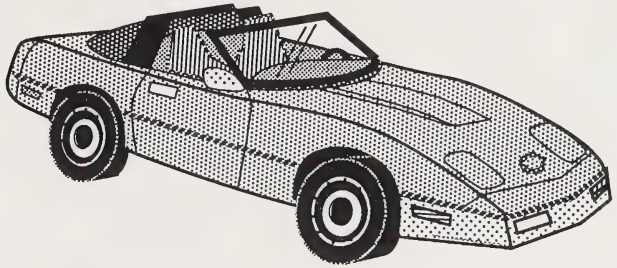
4. Carol wallpapered $\frac{1}{5}$ of the livingroom walls. Mike painted as much of the walls as Carol wallpapered, plus he painted another $\frac{2}{5}$ of the walls.

   a. What fraction of the walls did Mike paint?

   b. What fraction of the walls was wallpapered and painted?

Space for Your Work

5. The gas tank in Ahmud's car is $\frac{1}{4}$ full. He adds $\frac{1}{2}$ of a tank of gas. How much gas does he have now?

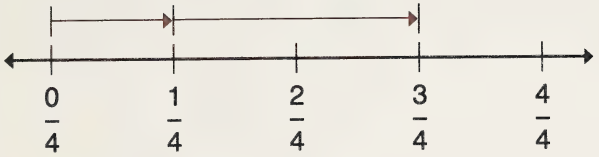


See your learning facilitator to check your answers and to receive further instructions.

Working Together

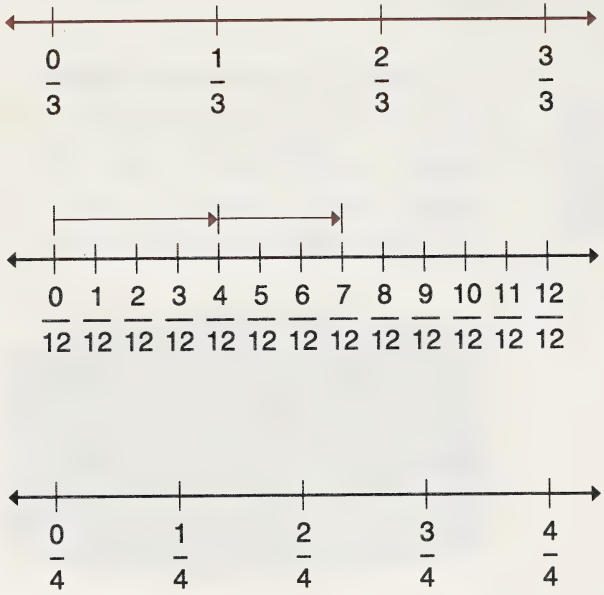
Number lines can be used to add fractions.

Example 1 What is $\frac{1}{4} + \frac{2}{4}$?



So $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$.

Example 2 What is $\frac{1}{3} + \frac{1}{4}$?



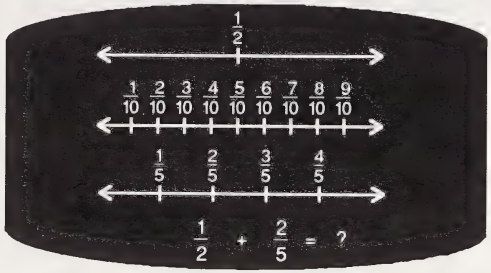
So $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$.

Extra Practice

Do either Question 1 or 2, and then do Questions 3-5.

Computer Alternative

1. If you can use the computer software that comes with the module, do Program 4 (Adding Fractions) on the *Fraction Factory* disk. To select this program press the space bar when this picture appears on the screen.

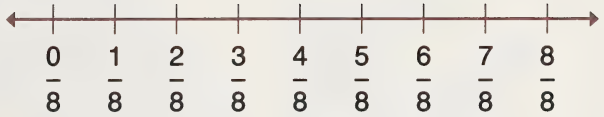


Print Alternative

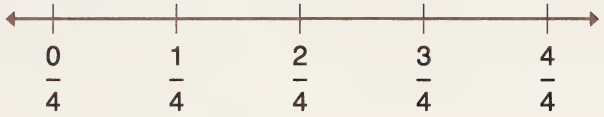
Space for Your Work

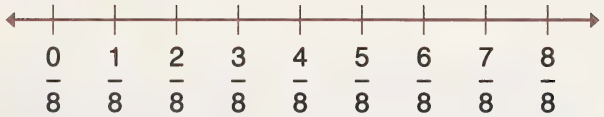
2. Use number lines to add the following.

a. $\frac{1}{8} + \frac{3}{8}$

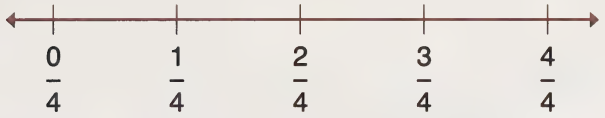


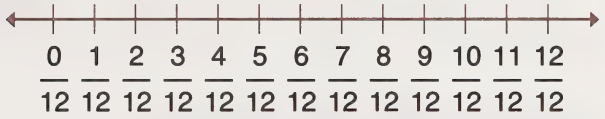
b. $\frac{1}{4} + \frac{3}{8}$

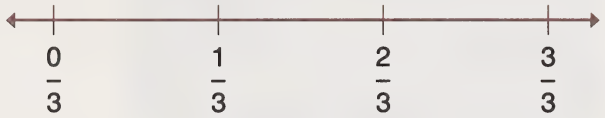




c. $\frac{1}{4} + \frac{2}{3}$







Space for Your Work

Space for Your Work

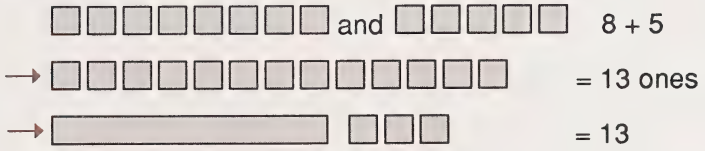
3. Mary's collie ate $\frac{1}{3}$ of a can of dog food. Her St. Bernard ate $\frac{1}{2}$ of a can of dog food. How much dog food did the two pets eat altogether?

See your learning facilitator to check your answers and to receive further instructions.

Working Together

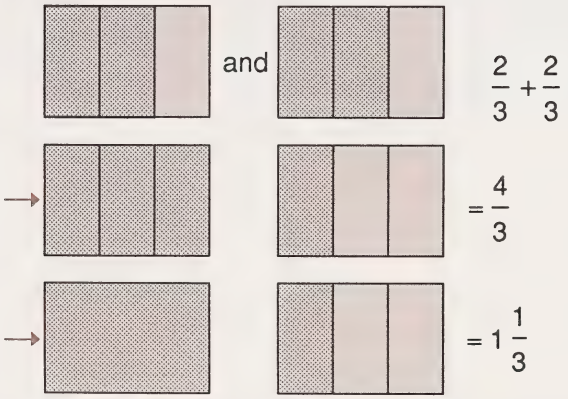
When you add whole number you sometimes need to regroup.

Example

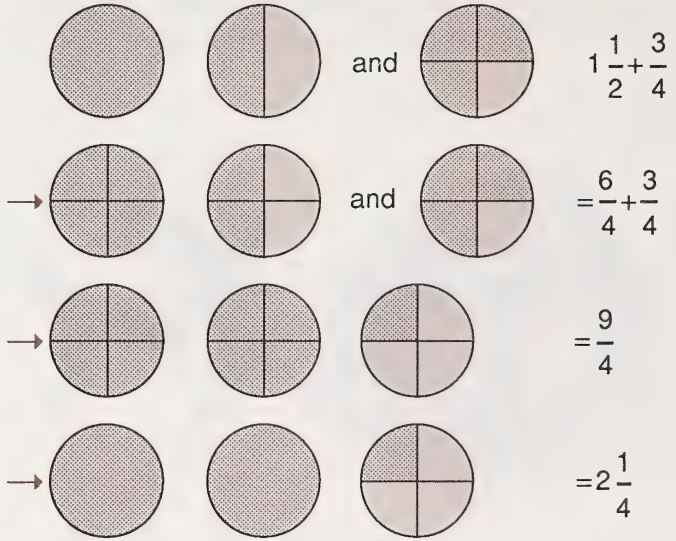


When you add fractions you sometimes need to regroup.

Example 1



Example 2

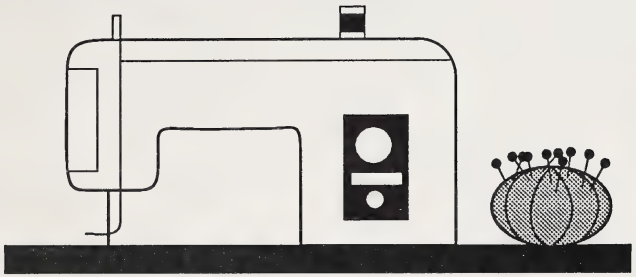


Concluding Activities

Space for Your Work

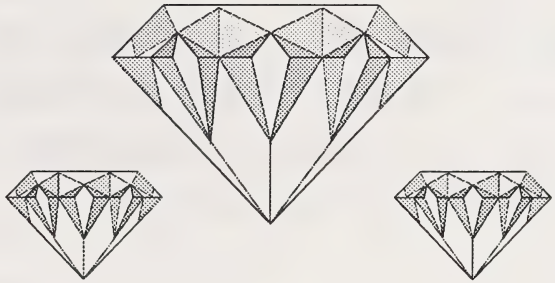
Use pattern blocks or diagrams to solve the following.

1. Denzil sewed by hand for $1\frac{1}{4}$ hours. Then he sewed by machine for $2\frac{1}{4}$ hours. How long did he sew altogether.



Space for Your Work

2. Minal has a broach with three diamonds. One diamond is $1\frac{1}{2}$ carats. The other two diamonds are each $\frac{3}{4}$ carats. What is the total weight of the diamonds?



See your learning facilitator to check your answers and to receive further instructions.

SUBTRACTING FRACTIONS CONCRETELY

What Lies Ahead

In this section you will learn these skills.

- using learning aids to subtract fractions with common and different denominators
- expressing the difference of fractions in simplest form

Working Together

In this section you will be subtracting fractions.

Learning Aids Activities

You will begin by using pattern blocks.

Turn to the *Learning Aids Booklet* and do Exercise F.

Working Together

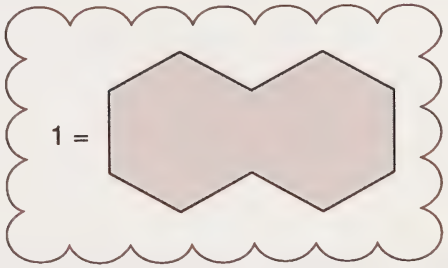
In the Learning Aids Activities you learned that subtract means "take away."

The examples in this section summarize what you learned about subtracting fractions.

Subtracting Fractions With Common Denominators

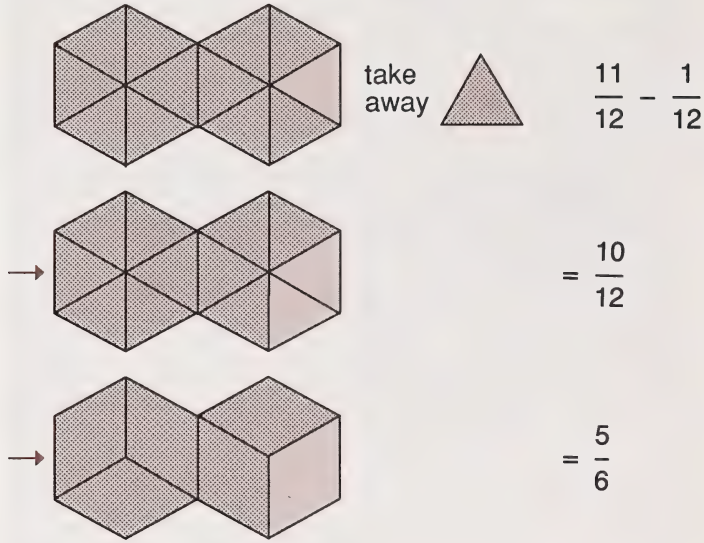
Fractions can easily be subtracted if they have common denominators.

Example



What is $\frac{11}{12} - \frac{1}{12}$?

Solution



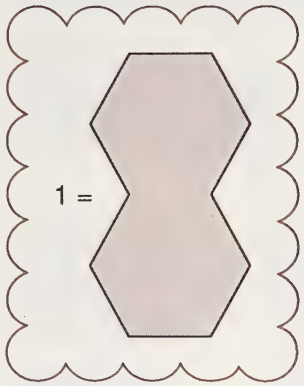
So $\frac{11}{12} - \frac{1}{12} = \frac{5}{6}$.

Note: Answers should be expressed in simplest form.

Subtracting Fractions With Unlike Denominators

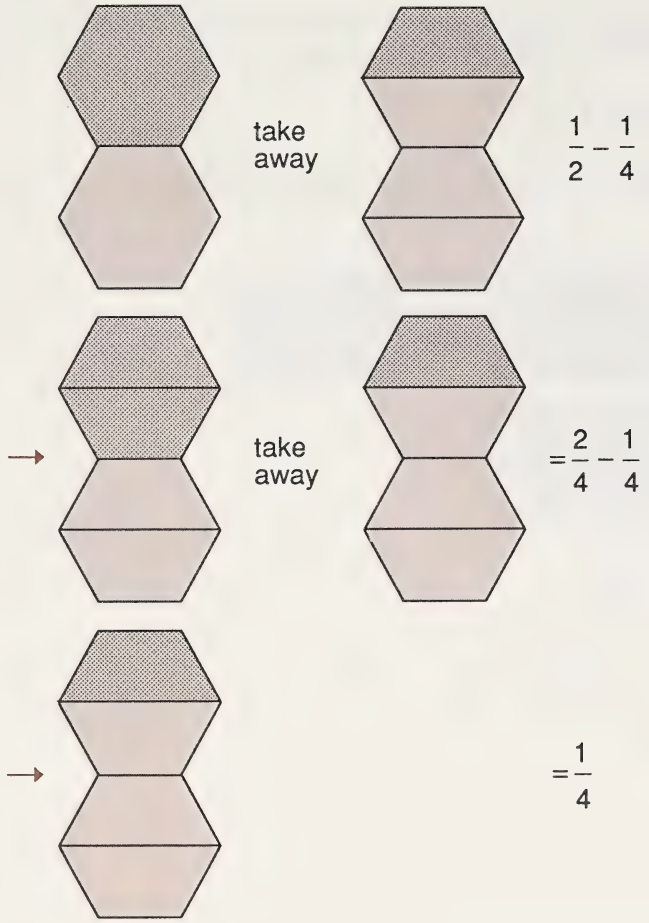
You must change unlike denominators to subtract.

Example



What is $\frac{1}{2} - \frac{1}{4}$?

Solution

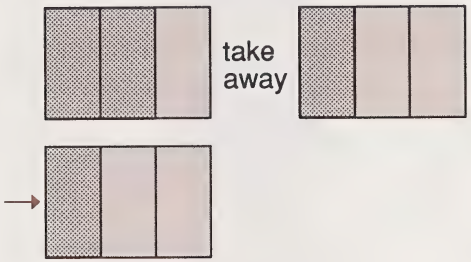


Describing Diagrams

You should now be able to write number sentences to describe diagrams of fractions.

Example

Write a number sentence for the following.

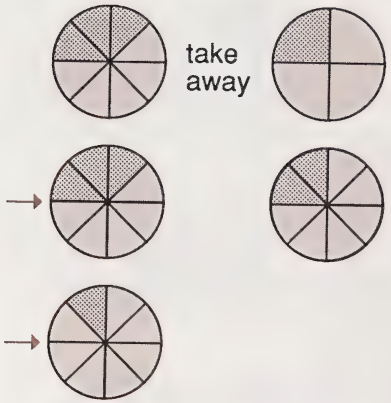


Solution

$$\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$$

Example

Write a number sentence for the following.



Solution

$$\frac{3}{8} - \frac{1}{4}$$

$$= \frac{3}{8} - \frac{2}{8}$$

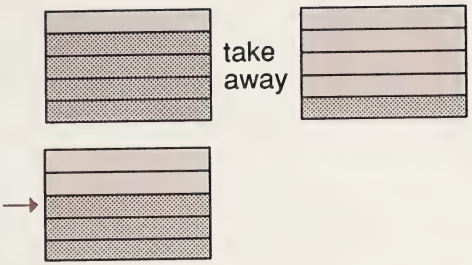
$$= \frac{1}{8}$$

Practice Activities

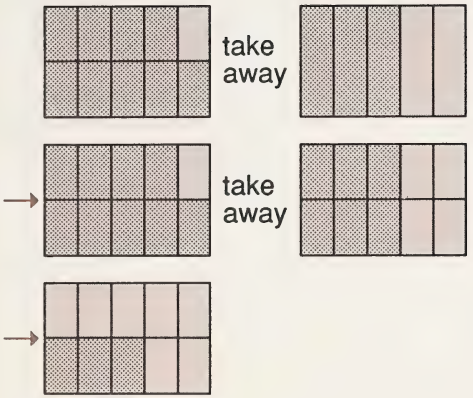
Space for Your Work

1. Write number sentences for the following.

a.

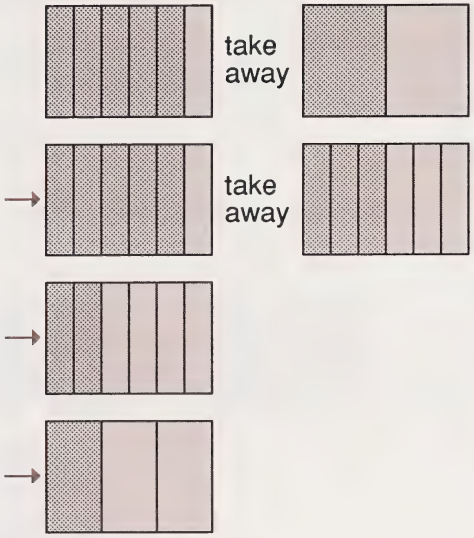


b.



Space for Your Work

c.



Space for Your Work

2. Complete the diagrams and write number sentences to show the following.

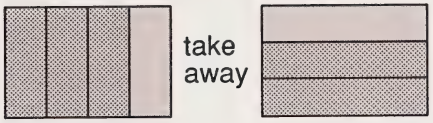
   a.

   →

   →

   →

Space for Your Work

b. 

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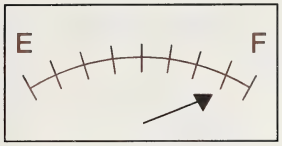
Space for Your Work

Use pattern blocks, diagrams or number lines to solve the following.

3. The gas tank in Mrs. Cox's car was $\frac{7}{8}$ full.



She used $\frac{1}{4}$ tank to drive from her home in Barrhead to Edmonton.

a. What fraction of a tank of gas is left?

b. Will she need more gas to return home?

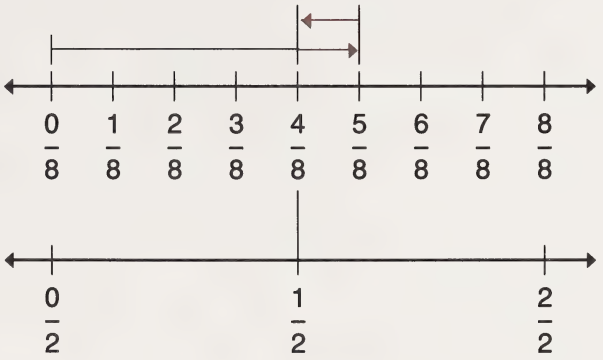
See your learning facilitator to check your answers and to receive further instructions.

Working Together

Number lines can be used to subtract fractions.

Example 1 What is $\frac{5}{8} - \frac{1}{8}$?

Solution

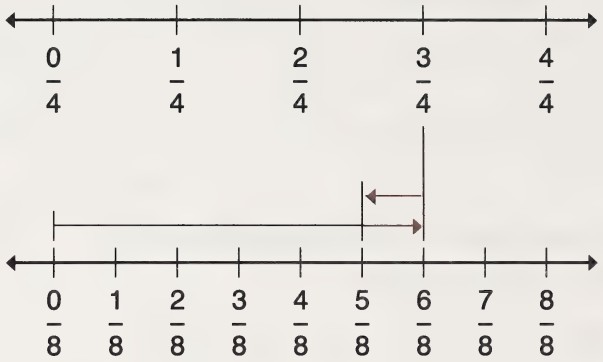


So $\frac{5}{8} - \frac{1}{8} = \frac{4}{8}$

$= \frac{1}{2}$

Example 2 What is $\frac{3}{4} - \frac{1}{8}$?

Solution



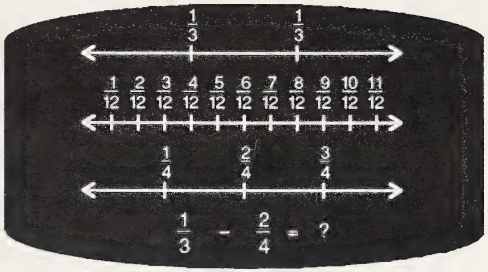
So $\frac{3}{4} - \frac{1}{8} = \frac{5}{8}$.

Extra Practice

Do either Question 1 or 2, and then do Question 3.

Computer Alternative

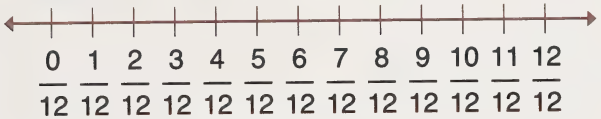
1. If you can use the computer software that comes with this module, do Program 5 (Subtracting Fractions) of the Fractions Factory disk. To select this program, press the space bar when this picture comes on the screen.

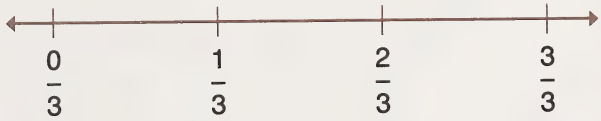


Space for Your Work

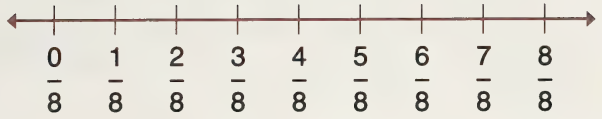
2. Use number lines to subtract the following.

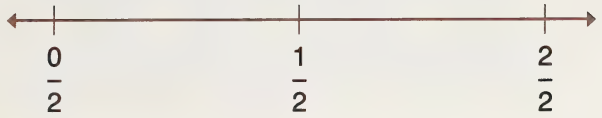
a. $\frac{5}{12} - \frac{1}{12}$

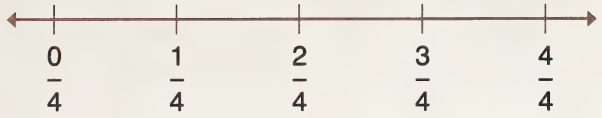




b. $\frac{7}{8} - \frac{1}{2}$

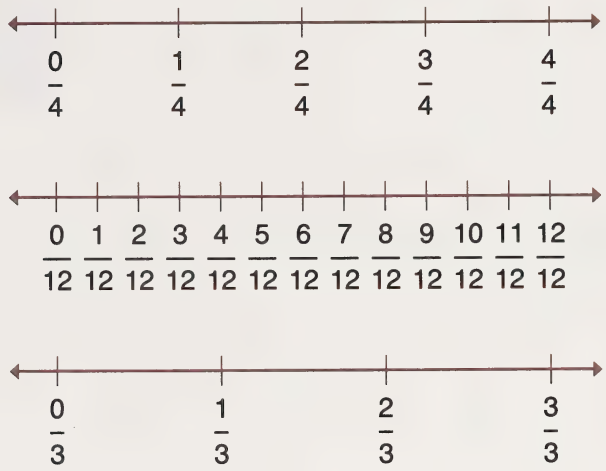






Space for Your Work

c. $\frac{3}{4} - \frac{1}{3}$



Space for Your Work

Space for Your Work

Use pattern blocks or diagrams to solve the following.

3. Bill ate $\frac{2}{5}$ of a submarine sandwich. Dennis ate $\frac{1}{3}$ of a submarine sandwich. If the submarine sandwiches were the same size, how much more did Bill eat?

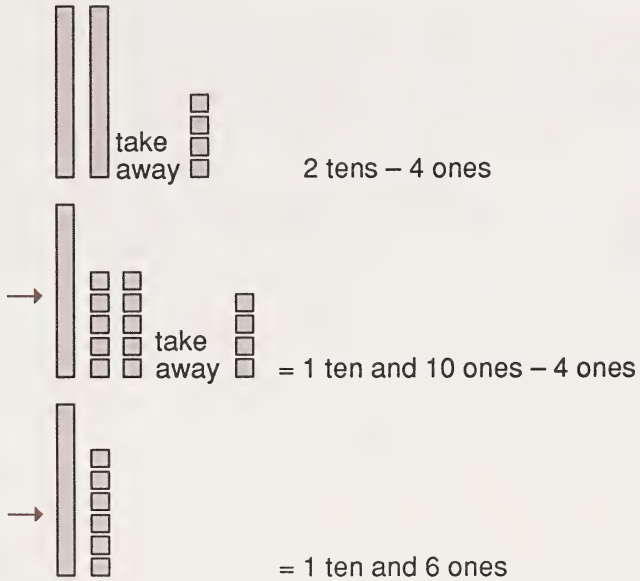
4. Yvonne and Ruth are both reading the same book. Yvonne has read $\frac{3}{4}$ of the book. Ruth has read $\frac{5}{6}$ of the book. How much more has Ruth read than Yvonne?

See your learning facilitator to check your answers and to receive further instructions.

Working Together

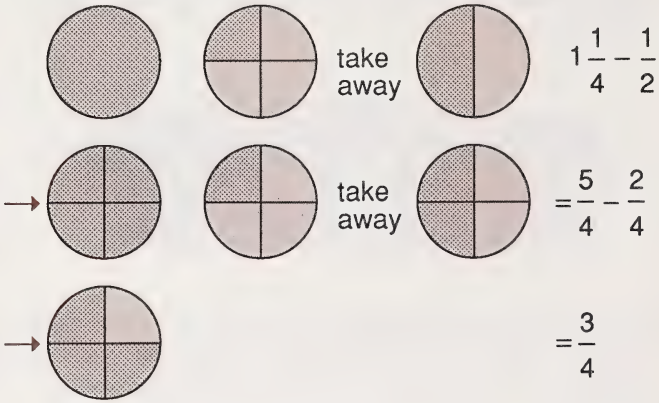
When you subtract whole numbers, you sometimes need to regroup or borrow.

Example



When you subtract fractions, you sometimes need to regroup.

Example



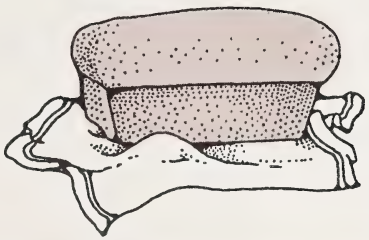
Concluding Activities

Space for Your Work

Use pattern blocks or diagrams to solve the following.

1. Sing-li had 4 decks to paint. If she painted $1\frac{1}{2}$ decks on Saturday, how many decks are left to paint?

2. Jason had $3\frac{3}{4}$ loaves of bread. He uses $2\frac{1}{4}$ loaves for sandwiches. How much bread was left?



See your learning facilitator to check your answers and to receive further instructions.

MULTIPLYING FRACTIONS CONCRETELY

What Lies Ahead

In this section you will learn these skills.

- using learning aids to multiply fractions
- expressing a product of fractions in simplest form

Working Together

In this section you will be multiplying fractions concretely.

Learning Aids Activities

You will begin by using pattern blocks.

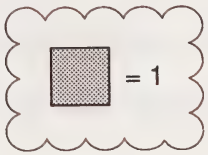
Turn to the *Learning Aids Booklet* and do Exercise G.

Working Together

In the Learning Aids Activities you learned the meaning of multiplying fractions.

When you multiply by a whole number, you have one or more groups.

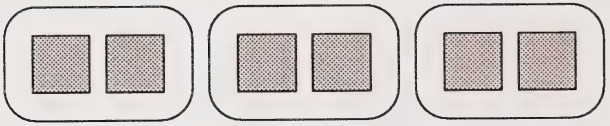
Example 1



What is 3×2 ?

Solution

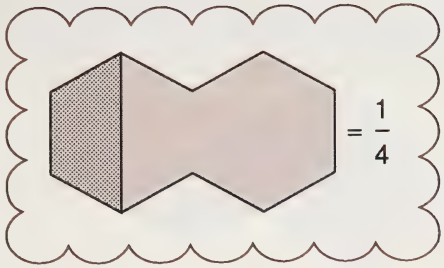
3×2 means 3 groups of 2.



Altogether there are 6.

So $3 \times 2 = 6$.

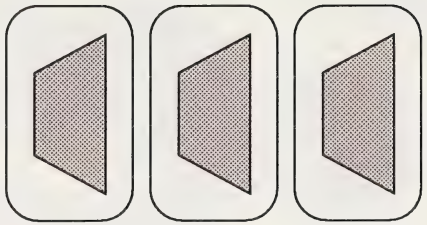
Example 2



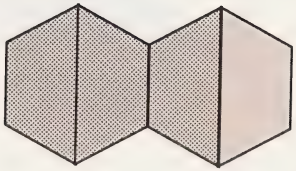
What is $3 \times \frac{1}{4}$?

Solution

$3 \times \frac{1}{4}$ means 3 groups of $\frac{1}{4}$.



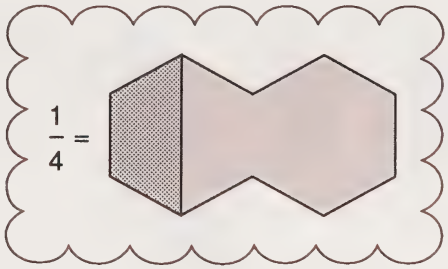
Altogether there are $\frac{3}{4}$.



So $3 \times \frac{1}{4} = \frac{3}{4}$.

You also learned what multiplying by a fraction means. When you multiply by a proper fraction, you have part of a group.

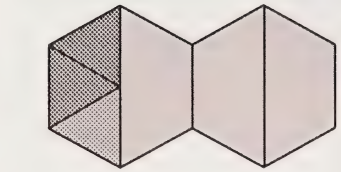
Example 1

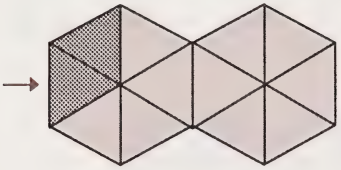


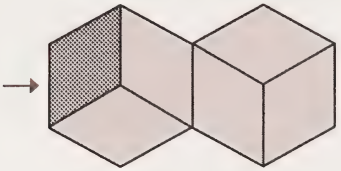
What is $\frac{2}{3} \times \frac{1}{4}$?

Solution

$\frac{2}{3} \times \frac{1}{4}$ can mean two of three equal parts of one-fourth.



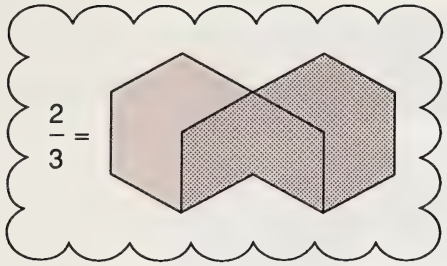




So $\frac{2}{3} \times \frac{1}{4} = \frac{1}{6}$

Note: Express all answers in lowest terms.

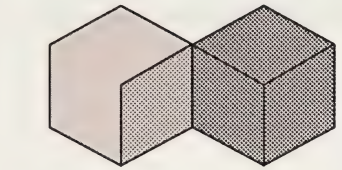
Example 2



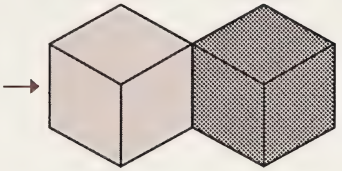
What is $\frac{3}{4} \times \frac{2}{3}$?

Solution

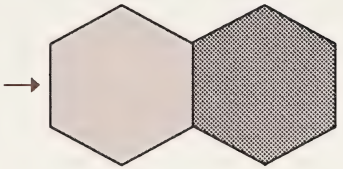
$\frac{3}{4} \times \frac{2}{3}$ can mean three of four equal parts of two-thirds.



$\frac{3}{4} \times \frac{2}{3}$



$= \frac{3}{6}$



$= \frac{1}{2}$

So $\frac{3}{4} \times \frac{2}{3} = \frac{1}{2}$

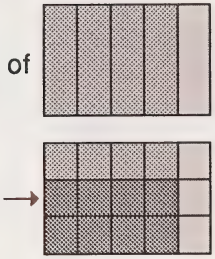
Describing Diagrams

You should be able to write number sentences to describe diagrams of fractions.

Example 1

Write a number sentence to describe the following.

two-thirds of



Solution

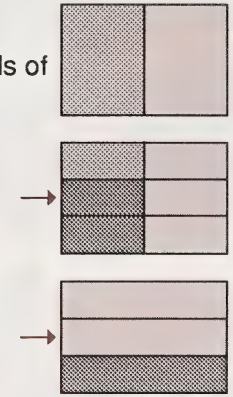
$$\frac{2}{3} \times \frac{4}{5}$$

$$= \frac{8}{15}$$

Example 2

Write a number sentence to describe the following.

two-thirds of



Solution

$$\frac{2}{3} \times \frac{1}{2}$$

$$= \frac{2}{6}$$

$$= \frac{1}{3}$$

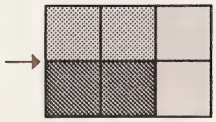
Practice Activities

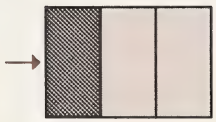
Space for Your Work

1. Write a number sentence for each of the following diagrams.

a. one-third of

b. one-half of





Space for Your Work

2. Complete the diagrams and write the number sentences.

a. one-half of

→

b. two-thirds of

→

→

Space for Your Work

c. two-thirds of

→

d. one-third of

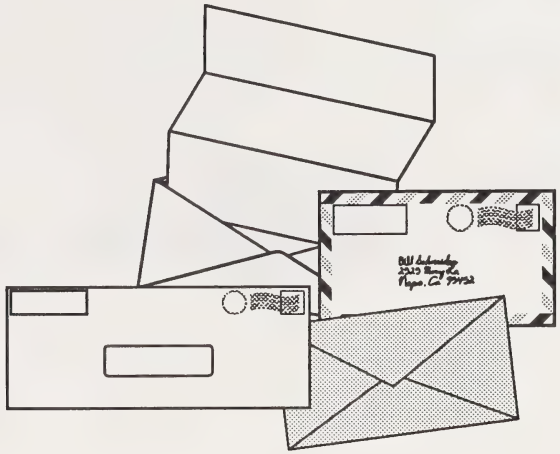
→

→

Space for Your Work

Use pattern blocks or diagrams to solve the following.

3. Joshua works on his stamp collection for $\frac{1}{2}$ h each day. If he only worked for $\frac{1}{3}$ of the time today how much time did he spend on stamp collecting today?



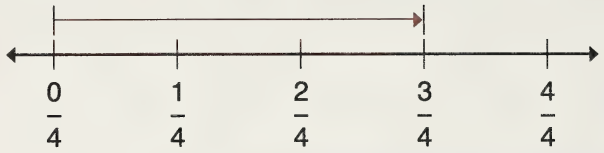
See your learning facilitator to check your answers and to receive further instructions.

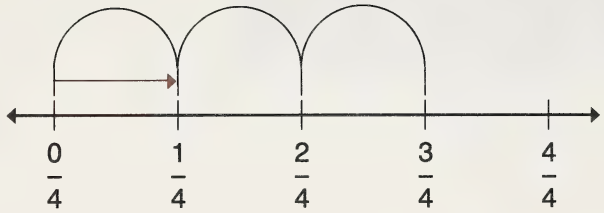
Working Together

You can use number lines to multiply fractions.

Example 1 What is $\frac{1}{3}$ of $\frac{3}{4}$?

$\frac{1}{3} \times \frac{3}{4}$ means 1 of 3 groups of $\frac{3}{4}$.





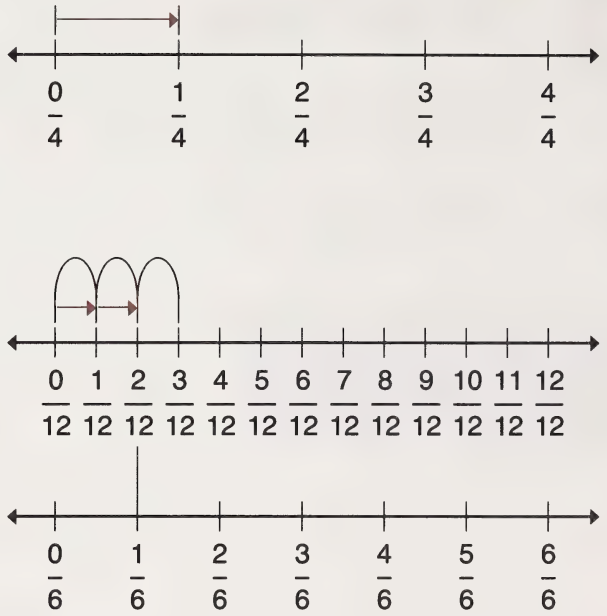
1 of 3 groups of $\frac{3}{4}$ is $\frac{1}{4}$.

So $\frac{1}{3} \times \frac{3}{4} = \frac{1}{4}$.

Example 2 What is $\frac{2}{3}$ of $\frac{1}{4}$?

Solution

$\frac{2}{3} \times \frac{1}{4}$ means 2 of 3 groups of $\frac{1}{4}$.



2 of 3 groups of $\frac{1}{4}$ is $\frac{2}{12}$ or $\frac{1}{6}$.

So $\frac{2}{3} \times \frac{1}{4} = \frac{2}{12}$

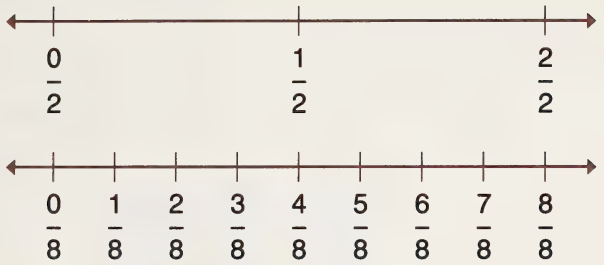
$= \frac{1}{6}$

Extra Practice

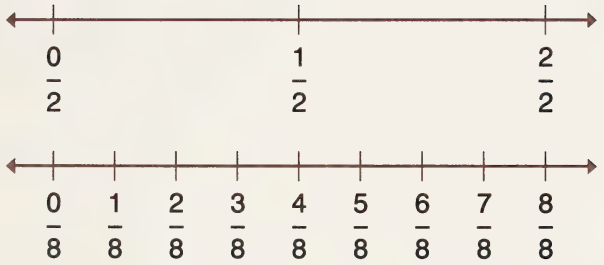
Space for Your Work

Use number lines to solve the following.

1. a. $\frac{1}{4} \times \frac{1}{2}$



b. $\frac{3}{4} \times \frac{1}{2}$



Space for Your Work

Use pattern blocks, diagrams or numberlines to solve the following.

2. A shelf in a store can hold $\frac{3}{4}$ of a large carton of soup cans. How much will $\frac{1}{2}$ a shelf hold?

3. A construction crew can finish $\frac{1}{3}$ of a house in a week. How much can it finish in $\frac{3}{5}$ of a week?

See your learning facilitator to check your answers and to receive further instructions.

Working Together

Consider these examples. In each a whole number is multiplied by a fraction.

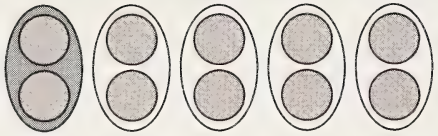
Example 1

Find $\frac{1}{5}$ of 10 balls.

Solution

$\frac{1}{5} \times 10$ means 1 of 5 equal parts of 10.

Group the 10 balls into 5 equal parts.

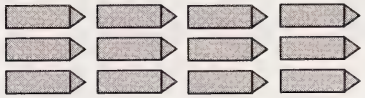


Each part has 2 balls.

So $\frac{1}{5} \times 10 = 2$.

Example 2

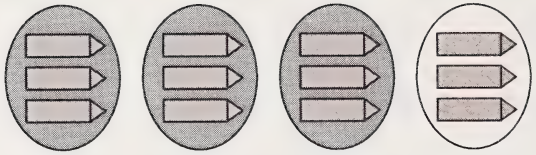
Find $\frac{3}{4}$ of 12 pencils.



Solution

$\frac{3}{4} \times 12$ means 3 of 4 equal parts of 12.

Group the pencils into 4 equal parts.



4 parts have 9 pencils.

So $\frac{3}{4} \times 12 = 9$.

Consider these examples. In each a mixed number is multiplied by a fraction.

Example

What is $\frac{1}{2}$ of $2\frac{1}{2}$?

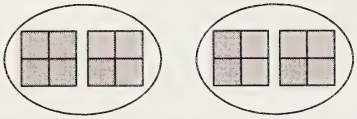
Solution

$\frac{1}{2} \times 2\frac{1}{2}$ means 1 of 2 equal parts of 2 and 1 of 2 equal parts of $\frac{1}{2}$.

You can't group $2\frac{1}{2}$ into 2 groups. It would be helpful if all the squares were in quarters.

$$2\frac{1}{2} = \frac{10}{4}$$

You can group $2\frac{2}{4}$ into 2 groups.



Each group has $\frac{5}{4}$ or $1\frac{1}{4}$.

$$\text{So } \frac{1}{2} \times 2\frac{1}{2} = \frac{1}{2} \times \frac{10}{4}$$

$$= \frac{5}{4}$$

$$= 1\frac{1}{4}$$

Concluding Activities

Space for Your Work

Use pattern blocks or diagrams or to solve the following.

1. A shirt costs $24. It is on sale for $\frac{1}{3}$ off.

   a. How much will you save by paying the sale price?

   b. How much will you pay for the shirt?

2. Ruth's mom takes $\frac{3}{4}$ minutes to read a page. How long will it take her to read 12 pages?

Space for Your Work

3. A recipe calls for $2\frac{1}{2}$ carrots (grated). If you were to make $\frac{1}{2}$ the recipe, how many carrots would you need?

See your learning facilitator to check your answers and to receive further instructions.

DIVIDING FRACTIONS CONCRETELY

What Lies Ahead

In this section you will learn these skills.

- using learning aids to divide fractions
- expressing quotients of fractions in simplest form

Working Together

In this section you will be dividing fractions.

Learning Aids Activities

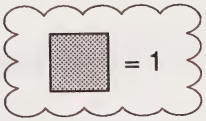
You will begin by using pattern blocks.

Turn to the *Learning Aids Booklet* and do Exercise H.

Working Together

In the Learning Aids Activities you learned what dividing by a whole number means.

Example 1

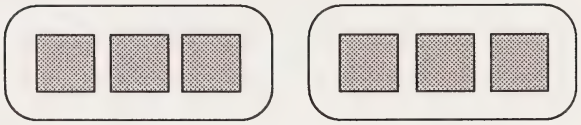


What is $6 \div 2$?

Solution

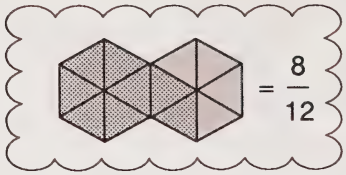
$6 \div 2$ means in 6 wholes there are 2 groups of how many?

There are 2 groups of 3 in 6.



So $6 \div 2 = 3$

Example 2

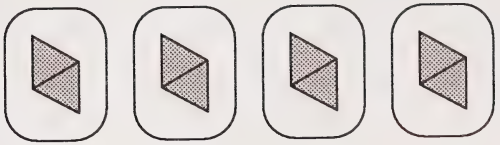


What is $\frac{8}{12} \div 4$?

Solution

$\frac{8}{12} \div 4$ means in $\frac{8}{12}$ there are 4 groups of how many?

There are 4 groups of $\frac{2}{12}$ in $\frac{8}{12}$.



So $\frac{8}{12} \div 4 = \frac{2}{12}$

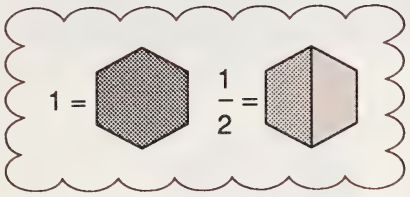
$= \frac{1}{6}$

$\frac{2}{12}$ is equivalent to $\frac{1}{6}$

You also learned what dividing by a fraction means.

Notice in the following three examples, the divisors are less than the dividends and the quotients are greater than 1.

Example 1



What is $1 \div \frac{1}{2}$?

Solution

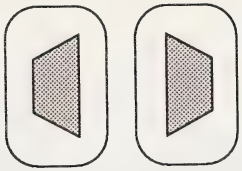
$1 \div \frac{1}{2}$ means in 1 whole there are how many groups of 1 half?

This quotient would be easier to find if the fractions had a common denominator.

$$1 \div \frac{1}{2} = \frac{2}{2} \div \frac{1}{2}$$

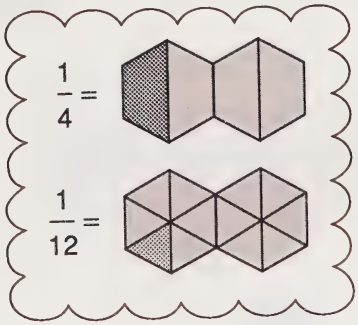
$\frac{2}{2} \div \frac{1}{2}$ means in 2 halves there are how many groups of 1 half?

There are 2 groups of 1 half in 2 halves.



So $1 \div \frac{1}{2} = 2$

Example 2



What is $\frac{1}{4} \div \frac{1}{12}$?

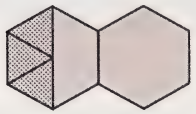
Solution

$\frac{1}{4} \div \frac{1}{12}$ means that in 1 quarter there are how many groups of 1 twelfth?

This quotient would be easier to find if the fractions had a common denominator.

$$\frac{1}{4} \div \frac{1}{12} = \frac{3}{12} \div \frac{1}{12}$$

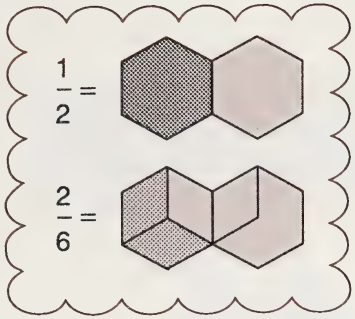
$\frac{3}{12} \div \frac{1}{12}$ means that in 3 twelfths there are how many groups of 1 twelfth?



There are 3 groups of 1 twelfth in 3 twelfths.

So $\frac{1}{4} \div \frac{1}{12} = 3$

Example 3



What is $\frac{1}{2} \div \frac{2}{6}$?

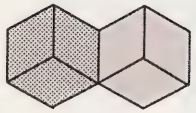
Solution

$\frac{1}{2} \div \frac{2}{6}$ means in 1 half there are how many groups of 2 sixths?

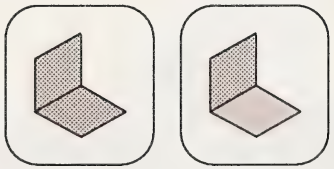
This quotient would be easier to find if the fractions had a common denominator.

$$\frac{1}{2} \div \frac{2}{6} = \frac{3}{6} \div \frac{2}{6}$$

$\frac{3}{6} \div \frac{2}{6}$ means that in 3 sixths there are how many groups of 2 sixths?



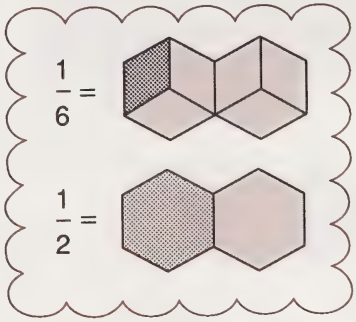
There are $1\frac{1}{2}$ groups of 2 sixths in 3 sixths.



So $\frac{1}{2} \div \frac{2}{6} = 1\frac{1}{2}$

In the following two examples the divisors are all greater than the dividends and the quotients are less than 1.

Example 1



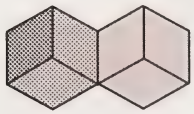
Solution

$\frac{1}{6} \div \frac{1}{2}$ means in 1 sixth there are how many groups of 1 half?

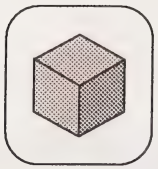
This quotient would be easier to find if the fractions had common denominators.

$$\frac{1}{6} \div \frac{1}{2} = \frac{1}{6} \div \frac{3}{6}$$

$\frac{1}{6} \div \frac{3}{6}$ means in 1 sixth there are how many groups of 3 sixths?

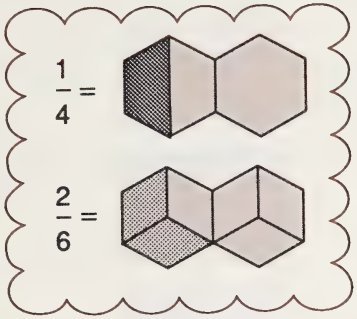


There is $\frac{1}{3}$ of a group of 3 sixths in 1 sixth.



So $\frac{1}{6} \div \frac{1}{2} = \frac{1}{3}$

Example 2



What is $\frac{1}{4} \div \frac{2}{6}$?

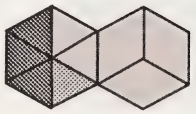
Solution

$\frac{1}{4} \div \frac{2}{6}$ means in 1 quarter there are how many groups of 2 sixths?

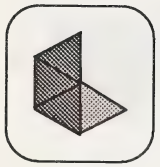
This quotient would be easier to find if the fractions had common denominators.

$$\frac{1}{4} \div \frac{2}{6} = \frac{3}{12} \div \frac{4}{12}$$

$\frac{3}{12} \div \frac{4}{12}$ means in 3 twelfths there are how many groups of 4 twelfths?



There is $\frac{3}{4}$ of a group of 4 twelfths in 3 twelfths.



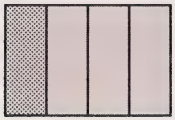
So $\frac{1}{4} \div \frac{2}{6} = \frac{3}{4}$.

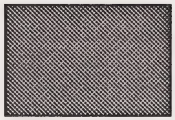
Describing Diagrams

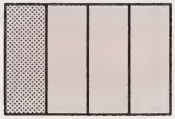
You should now be able to write number sentences from diagrams.

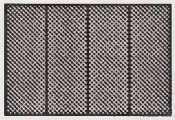
Example 1

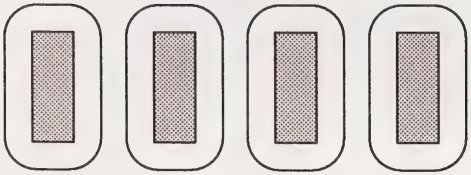
Write a number sentence to describe the following.

How many  are there

in  ?

→ How many  are there

in  ?

→ 

Solution

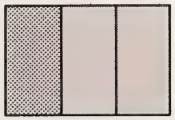
$$1 \div \frac{1}{4}$$

$$= \frac{4}{4} \div \frac{1}{4}$$

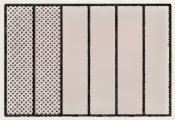
$$= 4$$

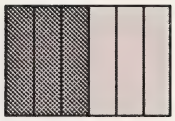
Example 2

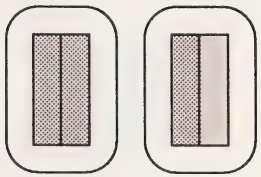
Write a number sentence to describe the following.

How many  are there

in ?

→ How many  are there

in  ?

→ 

Solution

$$\frac{1}{2} \div \frac{1}{3}$$

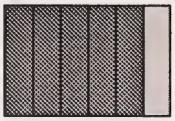
$$= \frac{3}{6} \div \frac{2}{6}$$

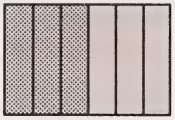
$$= 1\frac{1}{2}$$

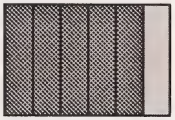
Example 3

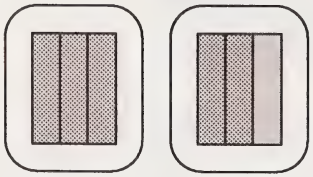
Write a number sentence to describe the following.

How many are there

in  ?

→ How many  are there

in  ?

→ 

Solution

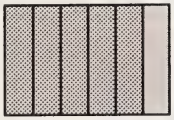
$$\frac{5}{6} \div \frac{1}{2}$$

$$= \frac{5}{6} \div \frac{3}{6}$$

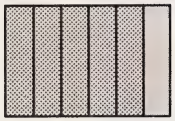
$$= 1\frac{2}{3}$$

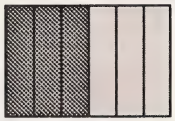
Example 4

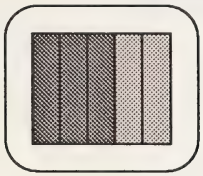
Write a number sentence to describe the following.

How many  are there

in ?

→ How many  are there

in  ?

→ 

Solution

$$\frac{1}{2} \div \frac{5}{6}$$

$$= \frac{3}{6} \div \frac{5}{6}$$

$$= \frac{3}{5}$$

Practice Activities

Space for Your Work

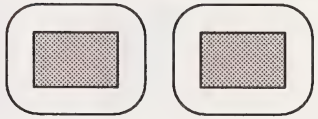
1. Write number sentences to describe each of these diagrams.

a. How many are there

in ?

→ How many are there

in ?

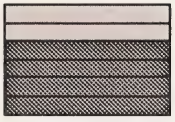
→ 

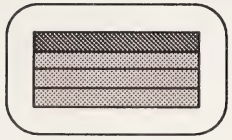
Space for Your Work

b. How many are there

in ?

→ How many are there

in  ?

→ 

Space for Your Work

c. How many are there

in ?

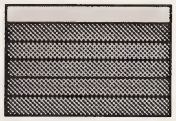
→ How many are there

in ?

→

Space for Your Work

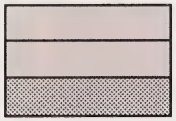
2. Complete each of the following diagrams and write the number sentences for each diagram.

a. How many are there in  ?

→

→

Space for Your Work

b. How many  are there

in ?

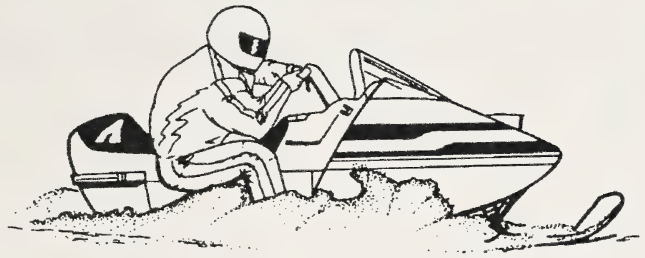
→

→

Space for Your Work

Use pattern blocks or diagrams to solve the following.

3. Jerrit used $\frac{1}{2}$ a tank of gas driving his snowmobile. If the snowmobile uses $\frac{1}{6}$ of a tank in one hour, how many hours did he drive it?



See your learning facilitator to check your answers and to receive further instructions.

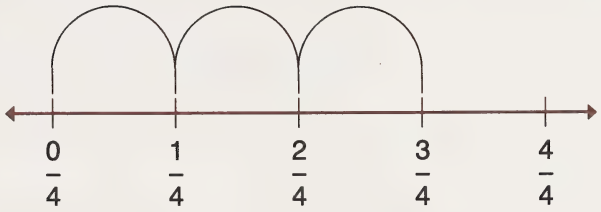
Working Together

You can use number lines to solve division problems.

Example 1

What is $\frac{3}{4} \div 3$?

$\frac{3}{4} \div 3$ means in $\frac{3}{4}$ there are 3 groups of how many?



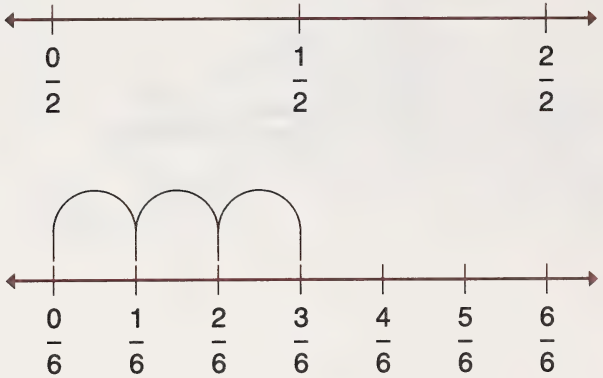
Each group has $\frac{1}{4}$.

So $\frac{3}{4} \div 3 = \frac{1}{4}$.

Example 2

What is $\frac{1}{2} \div 3$?

$\frac{1}{2} \div 3$ means in $\frac{1}{2}$ there are 3 groups of how many?



Each group has $\frac{1}{6}$.

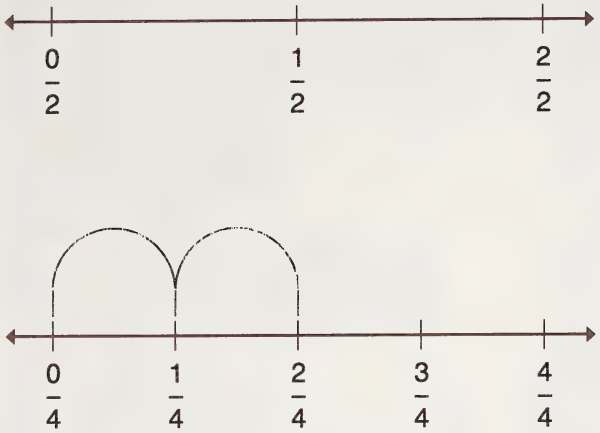
So $\frac{1}{2} \div 3 = \frac{3}{6} \div 3$

$= \frac{1}{6}$

Example 3

What is $\frac{1}{2} \div \frac{1}{4}$?

$\frac{1}{2} \div \frac{1}{4}$ means in $\frac{1}{2}$ there are how many groups of $\frac{1}{4}$?



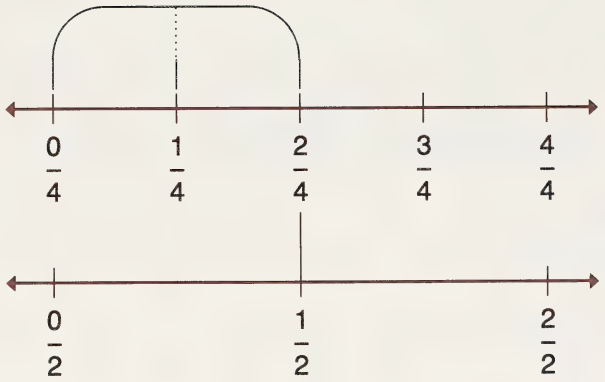
There are 2 groups of $\frac{1}{4}$.

So $\frac{1}{2} \div \frac{1}{4} = 2$.

Example 4

What is $\frac{1}{4} \div \frac{1}{2}$?

$\frac{1}{4} \div \frac{1}{2}$ means in $\frac{1}{4}$ there are how many groups of $\frac{1}{2}$?



There is $\frac{1}{2}$ of one group.

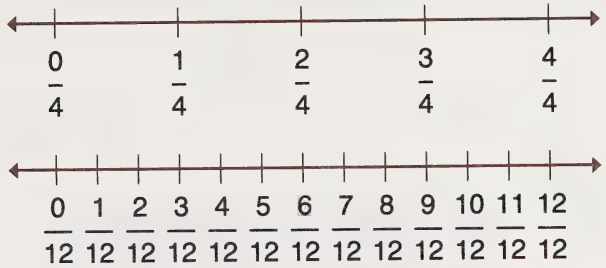
So $\frac{1}{4} \div \frac{1}{2} = \frac{1}{2}$.

Extra Practice

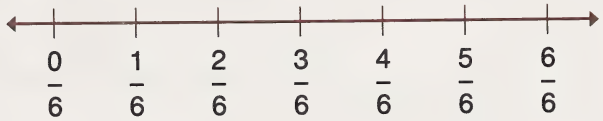
Space for Your Work

1. Use number lines to solve the following.

a. $\frac{3}{4} \div \frac{1}{12}$



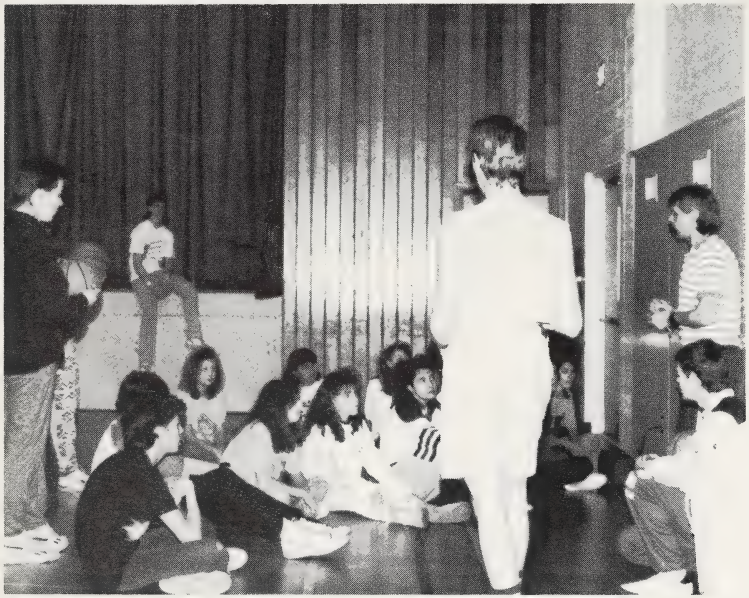
b. $\frac{5}{6} \div \frac{1}{3}$



Space for Your Work

Use pattern blocks, diagrams or number lines to solve the following.

2. Ruth attends exercise classes. If an exercise class lasts $\frac{1}{2}$ hour, how many exercise classes can Ruth attend in $\frac{3}{4}$ hour?



See your learning facilitator to check your answers and to receive further instructions.

Working Together

Consider these examples. In each a whole number is divided by a fraction.

Example $3 \div \frac{1}{2}$

$3 \div \frac{1}{2}$ means in 3 there are how many groups of $\frac{1}{2}$?

$\frac{6}{2} \div \frac{1}{2}$ means in $\frac{6}{2}$ there are how many groups of $\frac{1}{2}$?

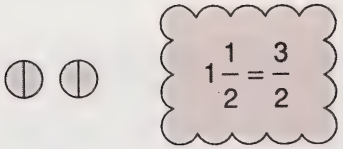
There are 6 groups of $\frac{1}{2}$.

So $3 \div \frac{1}{2} = \frac{6}{2} \div \frac{1}{2}$

$= 6$

Example $1\frac{1}{2} \div \frac{1}{2}$

$1\frac{1}{2} \div \frac{1}{2}$ means in $1\frac{1}{2}$ there are how many groups of $\frac{1}{2}$?



$\frac{3}{2} \div \frac{1}{2}$ means in $\frac{3}{2}$ there are how many groups of $\frac{1}{2}$?

There are 3 groups of $\frac{1}{2}$.

So $1\frac{1}{2} \div \frac{1}{2} = \frac{3}{2} \div \frac{1}{2}$

$= 3$

Concluding Activities

Space for Your Work

1. Lois has 4 balls of wool. If a pair of baby booties use $\frac{1}{2}$ of a ball of wool, how many pairs of baby booties can she make?

2. Jamie gives private figure skating lessons. Each lesson takes $\frac{1}{2}$ of an hour. In 4 hours how many lessons can Jamie give?

Space for Your Work

3. Joe Nepoose can remove the snow from a driveway in $\frac{3}{4}$ h. How many driveways can he clear in 6 hours?

4. A shelf in a grocery store will hold 3 cartons of cereal boxes. How many shelves will be needed to display $1\frac{1}{2}$ cartons of cereal boxes?

See your learning facilitator to check your answers and to receive further instructions.

What Lies Ahead

In this summary you will review these skills.

- interpreting a fraction
- using multiplication and division to find equivalent fractions
- expressing fractions in simplest form
- expressing amounts as mixed numbers and fractions greater than 1
- expressing decimals as fractions in simplest form
- expressing fractions as decimals
- comparing and ordering fractions
- adding and subtracting fractions with common and different denominators
- multiplying and dividing fractions
- writing fractions in simplest form

Working Together

At this point, it would be a good idea to review the skills you have learned in Sections 1 - 10.

Turn to Section 1 and review the Pretest. Then correct any errors you may have made. You may be pleasantly surprised to discover how much you have learned!

PART TWO

In Sections 13 - 19 you will be working with decimal numbers.

Decimals number are used with metric units.

This part of the module should be very helpful to you in your everyday life.

What Lies Ahead

In this section you will test these skills.

- interpreting place values of digits in a decimal number
- reading a decimal number
- writing a decimal number in standard form and expanded form
- comparing and ordering decimal numbers
- rounding decimal numbers
- adding, subtracting, multiplying and dividing decimal numbers

Working Together

The Pretest in this section will help you and your learning facilitator to discover your strengths and weaknesses with decimal numbers.

Pretest

Space for Your Work

1. Use base 10 blocks to represent

   a. 1.1

   b. 1.11

   c. 1.111

   d. 1.011

   e. 1.01

   f. 1.001

   g. 1.101

Space for Your Work

2. Express the following numbers in standard form.

   a. $(4 \times 10) + (7 \times 1) + (2 \times 0.1) + (3 \times 0.01)$

   b. $(8 \times 100) + (3 \times 1) + (2 \times 0.01) +$
   (7×0.001)

3. Express the following numbers in expanded form.

   a. 3.17

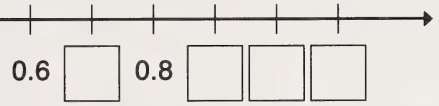
   b. 9.029

   c. 0.097

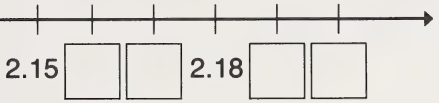
Space for Your Work

4. Complete the number line.

a.



b.



5. Below are the gold metal results in the 400 metre hurdles in the Olympics. Order the results from greatest to least.

1968	Dave Hemery, Great Britain	48.1
1972	John Aku-Bua, Uganda	47.82
1976	Edwin Moses, U.S.A.	47.64
1980	Volder Beck, E. Germany	48.70
1984	Edwin Moses, U.S.A.	47.75

Space for Your Work

6. Round each of the following to the nearest hundredth.

   a. $5.246

   b. $0.895

   c. $27.512

7. Use base 10 blocks to model each of the following.

   a. 1.09 + 0.543

   b. 0.854 – 0.78

Space for Your Work

8. Estimate each sum or difference.

   a. $\begin{array}{r} 4.85 \\ +2.27 \\ \hline \end{array}$

   b. $\begin{array}{r} 0.89 \\ -0.873 \\ \hline \end{array}$

   c. $6.28 + 20.7 + 3.93$

   d. $10 - 5.76$

9. Compute the exact sum or difference in Question 8. Do not use a calculator.

Space for Your Work

10. Use base 10 blocks to model the following.

    a. 0.23×3

    b. 0.23×0.1

    c. 0.23×0.2

Space for Your Work

11. Estimate the following.

    a. $\begin{array}{r} 59 \\ \times 1.2 \\ \hline \end{array}$

    b. $\begin{array}{r} 0.72 \\ \times 0.8 \\ \hline \end{array}$

    c. $\begin{array}{r} 35.8 \\ \times 0.167 \\ \hline \end{array}$

12. Compute the exact product for each problem in Question 11. Do not use a calculator.

Space for Your Work

13. Use base 10 blocks to model the following.

    a. $0.8 \div 4$

    b. $0.8 \div 0.4$

14. Estimate each of the following.

    a. $83\overline{)697.2}$

    b. $73\overline{)37.23}$

    c. $5.8\overline{)3.596}$

    d. $12.1\overline{)41.14}$

Space for Your Work

15. Compute the exact quotient for each problem in Question 14. Do not use a calculator.

16. Use a calculator to find the remainder for each of these division problems.

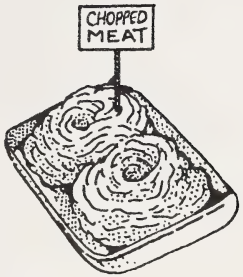
    a. 39 876 ÷ 5

    b. 12 345 ÷ 6

Space for Your Work

17. 5000 staples have a mass of 160.2 g. What is the mass of one staple rounded to the nearest hundredth?

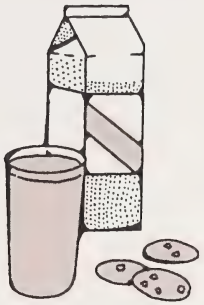
18. Chopped meat is sold at 3.95 per kg. What is the cost of a 2.85 kg package of chopped meat? Round your answer to the nearest cent.



Space for Your Work

19. The tree on Mr. McCarthy's lawn was 1.45 m tall four years ago. Since then it has grown 0.78 m taller. How tall is it now?

20. Mrs. Beaulieu used 0.25 L of milk from a new carton of milk. If the milk carton held 1 L of milk, how much is left?



See your learning facilitator to check your answers and to receive further instructions.

PLACE VALUE OF DECIMAL NUMBERS

What Lies Ahead

In this section you will learn these skills.

- interpreting the place values of digits in a decimal number
- reading a decimal number
- writing a decimal number in standard form and in expanded form

In this section you will use these words.

- place value
- standard form
- expanded form

Working Together

In this section you will be learning the place value of decimal numbers.

Learning Aids Activities

You will begin by investigating place value using base 10 blocks.

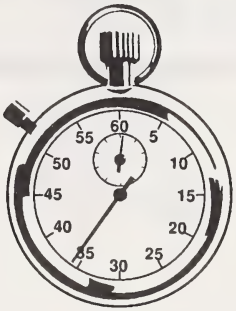
Take out the base 10 blocks and the *Learning Aids Booklet* and do Exercise I.

Working Together

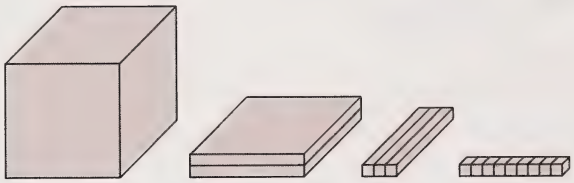
Place value is important in numbers. Your experience with base 10 blocks should help you understand place value.

Example

A stop watch was used to measure a flash of lightning. The flash of lightning lasted 1.239 seconds. Represent the time of the lightning flash using base 10 blocks.



Solution



$$1 + 2(0.1) + 3(0.01) + 9(0.001)$$

$$= 1.239$$

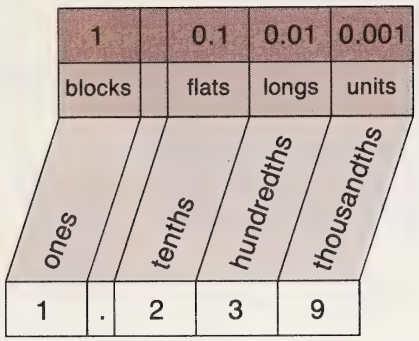
Reading Decimal Numbers

A place-value chart will help you read decimal numbers.

Example

How would you read 1.239?

Solution:



1.239 is read as "1 and 239 thousandths."

Note

- The decimal point is read as "and."
- The place names to the right of the decimal point end in "-ths."
- The last digit of the number is in the thousandths place. The number is read as "1 and 239 **thousandths**."

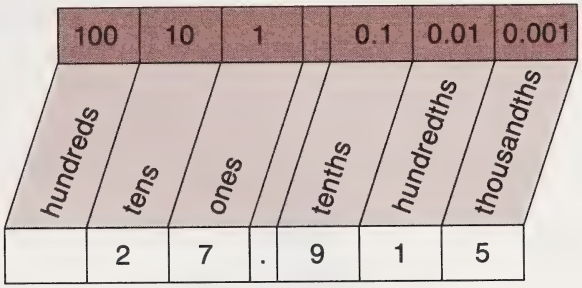
Writing Decimal Numbers in Expanded Form

A place-value chart will help you write decimal numbers in expanded form.

Example

Express 27.915 in expanded form.

Solution



$27.915 = 2(10) + 7(1) + 9(0.1) + 1(0.01) + 5(0.001)$

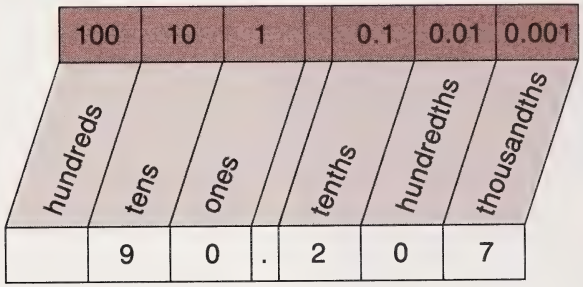
Writing Decimal Numbers in Standard Form

A place-value chart will help you write numbers in standard form.

Example

Express $9(10) + 2(0.1) + 7(0.001)$ in standard form.

Solution



$$9(10) + 2(0.1) + 7(0.001) = 90 + 0.2 + 0.007$$
$$= 90.207$$

Note: The zeros in the ones and hundredths places act as "place holders" in the numeral.

Practice Activities

Space for Your Work

Computer Alternative

1. If you have a computer, do Lesson 5 of the Decimals disk from the package *SRA Computer Drill and Instruction: Mathematics, Level D.* Read the instructions in the folder before using the program. Remember if you need help hold down the SHIFT key and press the ? key.

Print Alternative

2. Express each of the following in standard form.

   a. four and seven-tenths

   b. ten and eighty-one hundredths

   c. fifty and twelve thousandths

   d. $(3 \times 100) + (8 \times 10) + (4 \times 1) + (2 \times 0.1) + (7 \times 0.01) + (9 \times 0.00)$

Space for Your Work

e. $(4 \times 10) + (1 \times 0.1) + (6 \times 0.01)$

f. $(5 \times 100) + (9 \times 10) + (3 \times 1) + (8 \times 0.01)$

g. $(6 \times 0.01) + (3 \times 0.1) + (7 \times 0.001)$

3. Express the following in expanded form.

   a. 6.72

   b. 50.09

   c. 0.002

See your learning facilitator to check your answers and to receive further instructions.

Concluding Activities

Space for Your Work

1. Insert a decimal point to make each of these a reasonable statement.

   a. Barry caught a fish 825 cm long.

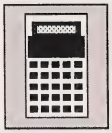
   b. The temperature was 183°C in the house.

   c. In 1987 the population of Canada was about 257 million people.

   d. The number of kilometres travelled, as shown on a car odometer, is 878653.

Space for Your Work

2. The display on most calculators can hold only 7 decimal places.



a. What happens when you enter a number with more than 7 decimal places such as 0.000 000 01?

b. What is displayed when you enter 0.000 000 1 ÷ 5?

See your learning facilitator to check your answers and to receive further instructions.

COMPARING AND ORDERING DECIMAL NUMBERS

What Lies Ahead

In this section you will learn these skills.

- comparing decimal numbers
- ordering decimal numbers

In this section you will use these words.

- equivalent decimal numbers

Working Together

In this section you will be comparing and ordering decimal numbers.

Learning Aids Activities

You will begin by using base 10 blocks to build models of decimal numbers and to compare them.

Turn to Exercise J in the *Learning Aids Booklet*.

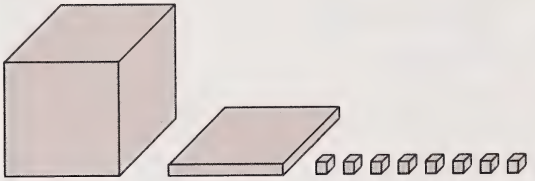
Working Together

Now that you have worked with base 10 blocks, you should be able to compare decimal numbers more easily.

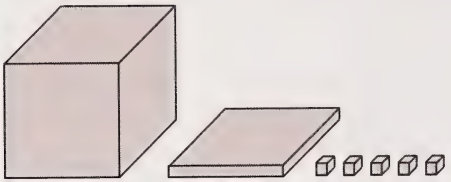
Example

Compare 1.18 and 1.15 using base 10 blocks.

Solution



1 + 0.1 + 0.08
= 1.18



1 + 0.1 + 0.05
= 1.15

From the blocks you can see that $1.18 > 1.15$.

Video Activity

Next watch the video *SOLVE IT: Ordering Decimals* and read the examples in this section.

If you cannot view the video, continue reading this section.

Place value charts are helpful when comparing decimal numbers.

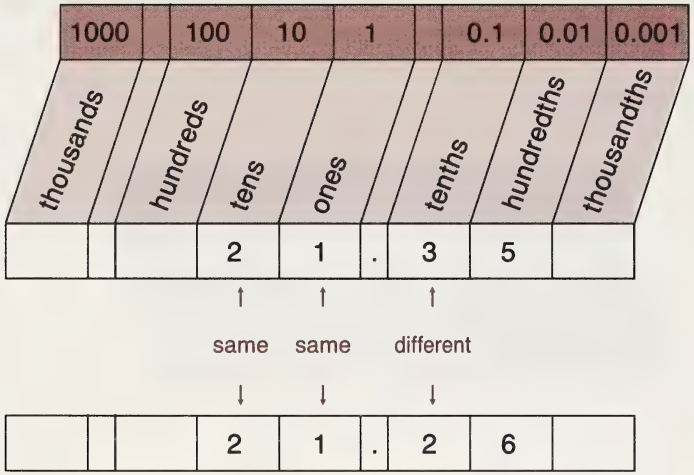
Example 1

The following chart shows the winning shot put distances at the Olympic games between 1972 and 1984.

Year	Winner	Distance
1972	Wladyslaw Komar, Poland	21.18 m
1976	Udo Beyer, East Germany	21.05 m
1980	Vladimir Kiselyov, U.S.S.R.	21.35 m
1984	Alessandro Andrei, Italy	21.26 m

Use a place value chart to compare the distances in 1980 and 1984 and tell which of the two distances is the greater.

Solution



$3 > 2$

3 tenths $>$ 2 tenths

$21.35 > 21.26$

Vladimir Kiselyov's distance was greater than Alessandro Andrei's distance.

Example 2

Compare the distances recorded by Wladyslaw Komar and Alessandro Andrei.

Solution

$1 < 2$

1 tenth $<$ 2 tenths

$21.18 < 21.26$

Wladyslaw Komar's distance was less than Alessandro Andrei's distance.

Example 3

Arrange the distances in Example 1 in descending order. That is, arrange the distances from longest to shortest.

Solution

The following chart lists the distances in Example 1 in descending order:

Year	Winner	Distance
1980	Vladimir Kiselyov	21.35 m
1984	Alessandro Andrei	21.26 m
1972	Wladyslaw Komar	21.18 m
1976	Udo Meyer	21.05 m

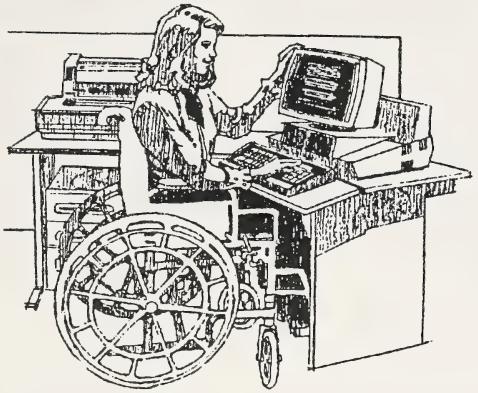
Note: If you were asked to arrange the distance in ascending order, you would list them from shortest to longest.

Practice Activities

Space for Your Work

Computer Alternative

1. Do Lesson 3, 8 and 9 of the Decimals disk from the package *SRA Computer Instruction and Drill, Mathematics D.* Read the instructions in the folder with the disk before using the program. Remember if you need help or have an error, hold down the SHIFT key and press the ? key.



Print Alternative

Space for Your Work

2. Arrange the batting average of these Toronto Blue Jay players in order from lowest to highest.

Barfield, Jesse	0.273
Bell, George	0.287
Fernandez, Tony	0.295
Garcia, Damaso	0.288
Mulliniks, Rance	0.280
Upshaw, Willie	0.268
Whitt, Ernie	0.248

Space for Your Work

3. Use $<$, $>$, or $=$ to make each of the following a true statement.

   a. 8.15 ◯ 8.051

   b. 1.03 ◯ 1.2

   c. 0.7 ◯ 0.007

   d. 0.006 ◯ 0.01

   e. 53.21 ◯ 532.1

   f. 1.380 ◯ 1.38

   g. 4.69 ◯ 4.96

   h. 0.020 ◯ 0.2

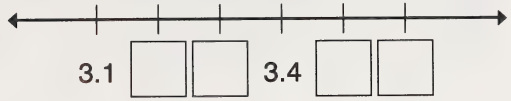
See your learning facilitator to check your answers and to receive further instructions.

Working Together

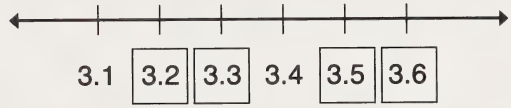
Decimal numbers can be represented on a number line.

Example 1

Complete the number line below.



Solution



Note: The numbers on a number line increase in value from left to right.

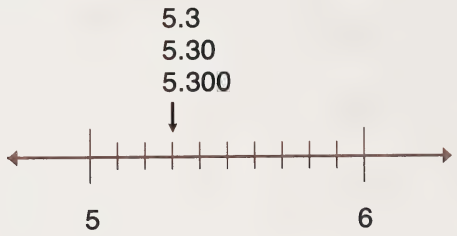
Example 2

Locate 5.3, 5.30, and 5.300, on a number line.

Solution

5.3, 5.30 and 5.300 are equivalent decimals.

These numbers represent the same point on the number line.

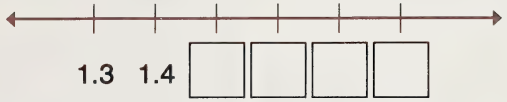


Concluding Activities

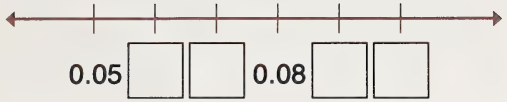
Space for Your Work

Complete each of these number lines.

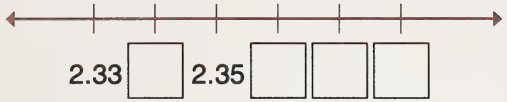
1.



2.



3.



See your learning facilitator to check your answers and to receive further instructions.

ROUNDING DECIMAL NUMBERS

What Lies Ahead

In this section you will learn these skills.

- rounding decimal numbers to the nearest one, to the nearest tenth, to the nearest hundredth and to the nearest thousandth

Working Together

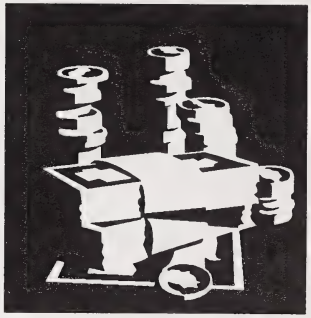
In Module 2 you learned how to round whole numbers.

In this section you will learn how to round decimal numbers.

Example

The following chart shows the value of major currencies in relation to the Canadian dollar on a particular day in 1986. Round the Canadian dollar values to the nearest hundredth.

Country	Currency	Value in Canadian Dollars
• United States	dollar	1.3652
• Britain	pound	2.0348
• West Germany	mark	0.5993



Solution

• United States dollar	1.3652	Find the rounding place.
	1.3652	Check the digit to the right of the rounding place. Is it 5 or more? Yes.
	1.37	Increase the digit in the rounding place by 1 and drop the digits to its right.
• British pound	2.0348	Find the rounding place.
	2.0348	Check the digit to the right of the rounding place. Is it 5 or more? No.
	2.03	Leave the digit in the rounding place as is and drop the digits to its right.
• West German mark	0.5993	Find the rounding place.
	0.5993	Check the digit to the right of the rounding place. Is it 5 or more? Yes.
	0.60	Increase the digit in the rounding place by 1 and drop the digits to its right. Note that you must regroup to the tenths place in this case.

Practice Activities

Space for Your Work

Computer Alternative

1. Do Lesson 11 of the Decimals disk from the package *SRA Computer Instruction and Drill: Mathematics, Level D.* Read the instructions in the folder with the disk before using the program. Remember if you need help or have an error hold down the SHIFT key and press the ? key.

Print Alternative

2. Round each amount given to the nearest dollar.

   a. $12.49

   b. $19.77

   c. $24.98

   d. $5.25

Space for Your Work

3. Round each mass given to the nearest tenth of a kilogram.

   a. 0.275 kg

   b. 1.62 kg

   c. 0.503 kg

   d. 1.29 kg

4. Round each height given to the nearest metre.

   a. 92.44 m

   b. 190.295 m

   c. 124 554 m

   d. 185.88 m

See your learning facilitator to check your answers and to receive further instructions.

Concluding Activities

Space for Your Work

1. a. Three packages of seeds are on sale for $1.00. If you buy only one package, the store will charge you $0.34. Explain the rounding rule that grocery stores use.

   b. If you buy two packages of seed, how much will the store charge you?

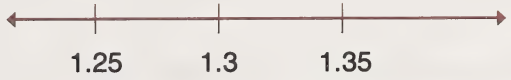
2. If you have only $20 to spend and you are buying items at the grocery store you may round all the numbers **up** to the nearest dollar. By doing this you will be sure that you have enough money. Round the following prices using this rule to see if you have enough money.

   $ 0.99
   3.35
   4.72
   1.15
   5.48
   1.79

Space for Your Work

3. 1.3 is said to be precise to the nearest tenth. That is 1.3 represents any number between $1.25, inclusive, and 1.35, exclusive, that is rounded to the nearest tenth.

Hint: Inclusive means including that number. Exclusive means not including that number. In the question 1.25 is included and 1.35 is not included.



a. 1.30 is precise to the nearest hundredth. What range of numbers does 1.30 represent?

b. What range of numbers does 1.300 represent?

c. What range does 7.949 represent?

d. What range does 2.300 represent?

e. What range does 1.00 represent?

See your learning facilitator to check your answers and to receive further instructions.

ADDING AND SUBTRACTING DECIMAL NUMBERS

What Lies Ahead

In this section you will learn to add and subtract decimal numbers.

Working Together

In this section you will be adding and subtracting decimal numbers.

Learning Aids Activities

You will begin by using base 10 blocks.

Turn to Exercise K and L in the *Learning Aids Booklet*.

Working Together

Now that you understand how to add and subtract decimal numbers using base 10 blocks you are ready to estimate and calculate sums and differences.

Example 1

Dale bought three floral arrangements. Use the picture below to find the total cost.

Solution

Estimate

- You can use front-end digits to estimate.

18 + 17 + 6 = 41

If you compensate the total is about 42.

- You can use rounding to estimate.

18 + 18 + 6 = 42

The total is about 42.

Calculate.

Line up the place values to add the decimal numbers. Use the decimal point as a guide.

$$\begin{array}{r} \$18.29 \\ 17.59 \\ +\ 6.19 \\ \hline \$42.07 \end{array}$$

The sum is reasonable since it is close to the estimate.

The total cost of the flower arrangements is $42.07.

Example 2

How much change should Dale receive from $50? Use Example 1.

Solution

Estimate $50 − $42 = $8

Dale should receive about $8 in change.

Calculate

Line up the place values to subtract. Use the decimal point as a guide.

	tens	ones		tenths	hundredths
$	5	0	.	0	0
−	4	2	.	0	7
	$	7	.	9	3

The result is reasonable.

He should receive $7.93 in change.

Note: You can check subtraction questions by adding the cost and the change. The sum should be $50.

$42.07
+ 7.93
$50.00

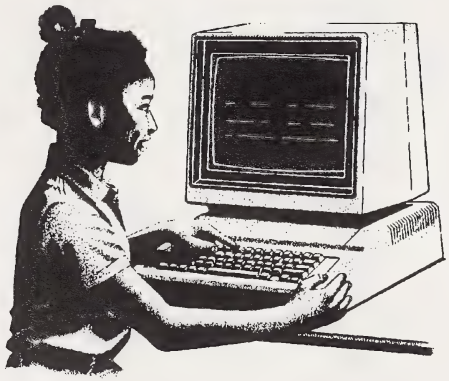
Practice Activities

Space for Your Work

Do Questions 1 or 2 - 3. Then do Questions 4 - 8.

Computer Alternative

1. Do Lesson 12 of the "Decimal" disk from the package *SRA Computer Instruction and Drill, Mathematics, Level D.* Read the instructions in the folder with the disk before using the program. Remember if you need help or have an error hold down the SHIFT key and press the ? key.



Space for Your Work

Print Altnerative

2. Find the sum or the difference for each of the following.

a. $\$ 3.86$
$+ 4.94$

b. 1.75
$+ 1.463$

c. 2.68
$+ 1.463$

d. 13.6
4.99
$+ 57.3$

e. 53.34
$- 17.28$

f. 7.15
$- 2.05$

Space for Your Work

3. Find the sum or the difference for each of the following.

   a. 0.83 + 0.5 + 7

   b. 2.90 + 3.07

   c. 0.881 – 0.082

   d. 0.293 – 0.05

   e. 6.06 + 2.34 + 50

   f. 430 – 75.9

   g. 0.3 – 0.222

   h. 9.64 – 8

Space for Your Work

4. Are these sums or differences reasonable? Calculate the ones that are not reasonable.

   a.
   $$\begin{array}{r} 0.999 \\ -\,0.013 \\ \hline 0.986 \end{array}$$

   b.
   $$\begin{array}{r} 10.25 \\ +\,89.96 \\ \hline 90.21 \end{array}$$

   c.
   $$\begin{array}{r} \$\ 9.83 \\ +\,7.18 \\ \hline \$\ 17.03 \end{array}$$

   d. $2.84 + 2.316 = 2.600$

   e.
   $$\begin{array}{r} 37.41 \\ -\,26.82 \\ \hline 10.59 \end{array}$$

   f. $0.756 + 0.29 = 0.785$

Space for Your Work

5. Janice wants to buy a skateboard which costs $229.95. She has $74.68 in her bank account now. How much more must she save to have enough money to buy the skateboard?

6. Carlo has a mass of 79.25 kg. He is carrying a pack with a mass of 3.15 kg. What is Carlo's total mass including the pack?

Space for Your Work

7. Nora's family received a telephone bill of $32.37. These are the long distance charges.

Claresholm, AB	$ 2.15
Toronto, ON	$ 6.72
Truro, NS	$10.43
Edmonton, AB	$ 2.77

a. What is the total of the long distance charges?

b. How much are the rental charges?
Hint: Rental Charges and Long Distance Charges = Total Bill

Space for Your Work

8. Bobby Rahal, who won the Indianapolis 500 in 1986, drove at an average speed of 274.743 km/h. Al Unser, who won in 1987, drove at an average speed of 260.988 km/h. How much faster did Bobby Rahal drive?

See your learning facilitator to check your answers and to receive further instructions.

Concluding Activities

Space for Your Work

Computer Alternative

1. If you can use the computer disk that comes with this module, do Program 1A "Decimal Dynamite" on Disk A of *MAC 7.*

Print Alternative

2. You are offered a job that pays $0.01 the first day $0.02 on the second, $0.04 the third day, $0.08 the fourth day, and so on. (Each day your salary is doubled.) How much will you earn by the end of 5 days, 10 days, 20 days. Use your calculator to compute the answer. Would you take the job? Why?

3. Write the digits in the boxes at the right to make the largest possible and the smallest possible answers. Use each digit only once. [1]

	Largest Answer	Smallest Answer
a. 9, 3, 1, 6	$\square\square.7 + \square.\square$	$\square\square.7 + \square.\square$
b. 3, 4, 7, 3	$6\square.\square - \square.\square$	$6\square.\square - \square.\square$
c. 8, 4, 7, 0	$3.4\square\square - 2.\square\square$	$3.4\square\square - 2.\square\square$

See your learning facilitator to check your answers and to receive further instructions.

[1] *Arithmetic Teacher*, March, 1987.

MULTIPLYING DECIMAL NUMBERS

What Lies Ahead

In this section you will learn to multiply decimal numbers.

Working Together

In this section you will be multiplying decimal numbers.

Learning Aids Activities

You will begin by using base 10 blocks.

Turn to Exercise M in the *Learning Aids Booklet*.

Working Together

Now that you understand what multiplication means, you are ready to estimate and calculate products of decimal numbers.

Example 1

Maureen bought 2.8 m fabric to cover a chair. If 1 m of the material costs $6.25, how much did she pay for the fabric?

Solution

Estimate

Use front-end digits

$2.8 \times 6.25 \doteq 2 \times 6$
$\doteq 12$

Maureen pays over $12. You may wish to compensate as this is a low estimate.

– or –

Round to numbers that you can multiply quickly in your head.

2.8×6.25 is about
3×6 or 18.

Maureen pays about $18.

Calculate

- You can use paper and pencil computations.

Multiply as with whole numbers. Then decide where the decimal point goes.

```
  6.25
× 2.8
 5 000
12 50
17.500
```

The estimate is $18. Put the decimal point after the 7.

17.500 is equivalent to 17.50

Maureen paid $17.50 for the fabric to cover her chair.

Another way to locate the decimal point in the product is to count the number of decimal places in the factors.

```
  6.25   (2 places)
× 2.8    (+ 1 place)
17.500   (3 places)
```

- You can use a calculator.

Key Press	Display
6 . 2 5 × 2 . 8 =	17.50

Example 2

Tom has a job mowing lawns. He earns $3.25 each hour he works. If he took 2.75 hours to mow Mrs. Nguyen's lawn, how much should he get paid? Round the amount of pay to the nearest hundredth.

Solution

Estimate

Use front-end digits.

$$3.25 \times 2.75 \doteq 3 \times 2$$
$$\doteq 6$$

Mrs. Nguyen should pay him at least $6. You may wish to compensate as this is a low estimate.

– or –

Round to numbers so that you can multiply quickly in your head.

3.25 × 2.75 is about 3 × 3 or 9

Mrs. Nguyen should pay him about about $9.

Calculate

- You can use paper and pencil computations. Multiply as with whole numbers. Then decide where the decimal goes.

```
  3.25
×2.75
 1625
2 275
6 50
8.9375
```

The estimate is $9. Put the decimal point after the 8.

8.9375 rounded to the nearest hundredth is 8.94.

Tom earned $8.94 for mowing Mrs. Nguyen's lawn.

Another way to locate the decimal point in the product is to count the number of decimal places in the factors.

```
  3.25   2 places
×2.75  + 2 places
8.9375   4 places
```

- You can use a calculator.

Key Press	Display
3 . 2 5 × 2 . 7 5 =	8.9375

Practice Activities

Space for Your Work

Computer Alternative

1. Do Lessons 13, 14, 15, 16 of the Decimals disk from the package *SRA Computer Instruction and Drill Mathematics, Level D.* Read the instructions in the folder with the disk before using the program. If you need help or have an error hold down the SHIFT key and press the ? key.

Print Alternative

Do not use a calculator for Questions 2 to 5.

2. Multiply each of the following.

   a. 2×4.32

   b. 0.75×0.6

   c. 5×1.56

   d. 0.94×4.006

Space for Your Work

Do not use a calculator for Questions 3 - 5.

3. For each of the following give an estimate and an exact calculated answer. Round the exact product to the nearest tenth.

   a. $\begin{array}{r} 28.1 \\ \times 0.73 \\ \hline \end{array}$

   b. $\begin{array}{r} 2.58 \\ \times 38.2 \\ \hline \end{array}$

   c. $\begin{array}{r} 80.02 \\ \times 20.3 \\ \hline \end{array}$

Space for Your Work

4. Place the decimal point in the product.

   a. $4.6 \times 1.8 = 828$

   b. $43.5 \times 7.5 = 32625$

   c. $1.8 \times 0.07 = 126$

5. Are the products reasonable? Calculate those products that are not reasonable.

   a.
   $$\begin{array}{r} 3.45 \\ \times 7.4 \\ \hline 255.3 \end{array}$$

   b.
   $$\begin{array}{r} 174 \\ \times 0.95 \\ \hline 16.53 \end{array}$$

   c.
   $$\begin{array}{r} 19.5 \\ \times 0.505 \\ \hline 9.8475 \end{array}$$

Space for Your Work

Use a calculator when solving Questions 6 - 9.

6. Shelah earns $24.50 per hour as a welder. If she works 36.25 hours in one week, how much does she earn?

7. Jean bought 44 L of regular unleaded gasoline at 38.2 cents per L. How much did it cost? Express your answer in dollars.

WESTFILE INC.

Space for Your Work

8. Mr. Wold sold 408.75 tonnes of wheat at $128.35 per tonne. How much did he get paid?

9. The Walters family bought 234.82 kg of beef for $2.58 per kg. How much did they pay?

See your learning facilitator to check your answers and to receive further instructions.

Concluding Activities

Space for Your Work

Computer Alternative

1. Do Program 8 "Multi-Maze" on Disk B of *MAC 6.*

Print Alternative

2. Write the digits 2, 8 6, 1 in the empty boxes to make the largest possible and the smallest possible answers. Use each digit only once.

Largest	Smallest
4 . ☐ ☐	4 . ☐ ☐
× ☐ ☐	× ☐ ☐

Space for Your Work

3. In the following place decimal points in four different ways to result in four true number sentences.

   a. 124 × 62 = 7688

   b. 124 × 62 = 7688

   c. 124 × 62 = 7688

   d. 124 × 62 = 7688

See your learning facilitator to check your answers and to receive further instructions.

DIVIDING BY A WHOLE NUMBER

What Lies Ahead

In this section you will learn to divide a decimal number by a whole number.

Working Together

In this section you will be dividing a decimal number by a whole number.

Learning Aids Activities

You will begin by using base 10 blocks.

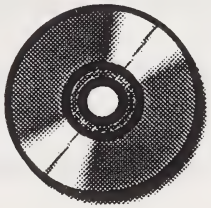
Turn to Exercise N in the *Learning Aids Booklet*.

Working Together

Now that you understand what division by a whole number means, you are ready to estimate and calculate quotients.

Example 1

Compact disks are on sale. If 4 compact disks cost 68.40, what is the price of one compact disk?



Solution

Estimate

Use friendly numbers. That is use numbers you can divide mentally.

68.40 ÷ 4 is about
68 ÷ 4 or 17.

One disk costs about $17.

Calculate

- You can use paper and pencil.

Divide as with whole numbers.

Place the decimal point for the quotient directly above the decimal point in the dividend.

$$
\begin{array}{r}
\$17.10 \\
4\overline{)\$68.40} \\
4 \\
\hline
28 \\
4 \\
\hline
4 \\
4 \\
\hline
0
\end{array}
$$

The quotient is reasonable since it is close to the estimate.

One compact disk costs $17.10.

- You can use a calculator.

Key Press	Display
6 8 . 4 0 ÷ 4 =	17.10

Note: You can check the division by multiplying.

$$
\begin{array}{r}
\$17.10 \\
\times \quad 4 \\
\hline
\$68.40
\end{array}
$$

2 places
+ 0 place
2 places

Example 2

For 2.37 ÷ 6 do an estimate and an exact calculation using paper and pencil.

Solution

Estimate

Use friendly numbers.

2.37 ÷ 6 is about 2.4 ÷ 6 or 0.4.

Calculate

Place the decimal point for the quotient directly above the decimal point in the dividend.

```
   0.395
6 ) 2.370
   18
    57
    54
     30
     30
```

Add a zero to help find the complete quotient.

Compare the estimated answer and the calculated answer.

The quotient is reasonable.

Example 3

For 0.486 ÷ 5 do an estimate and an exact calculation using paper and pencil.

Solution

Estimate

Use friendly numbers.

0.486 ÷ 5 is about 0.5 ÷ 5 or 0.1.

Calculate

0 is used as a place holder.

```
   0.0972
5 ) 0.4860
    45
     36
     35
      10
      10
```

Add a zero to help find the complete quotient.

Compare the estimated answer and the calculated answer.

The quotient is reasonable.

Practice Activities

Space for Your Work

Computer Alternative

1. If you have a computer, do Lesson 17 of the Decimal disk from the package *SRA Computer Instruction and Drill: Mathematics, Level D.* Read the instructions in the folder before you use the program. Remember if you need help or have an error hold down the SHIFT key and press the ? key.

Print Alternative

Do not use a calculator in Questions 2 - 8.

2. Do an estimate and an exact calculation for each of the following.

   a. $9\overline{)277.2}$

   b. $41\overline{)108.65}$

   c. $\frac{236.8}{74}$

Space for Your Work

3. Find the quotient for each of the following. Check your answer by multiplying.

   a. $68.5 \div 2$

   b. $54.8 \div 5$

   c. $584.57 \div 7$

   d. $74.48 \div 7$

4. Write the number of digits in the whole number part of the quotient for each of the following.

   a. $2\overline{)16.8}$

   b. $48\overline{)486.92}$

   c. $25\overline{)75.08}$

Space for Your Work

5. Position the decimal point so that the quotient is correct.

   a. $7.92 \div 8 = 99$

   b. $50.52 \div 12 = 421$

   c. $2.338 \div 7 = 334$

6. Are the quotients reasonable? Calculate the quotients that are not reasonable.

   a. $9\overline{)\,18.36}$ $\quad 20.40$

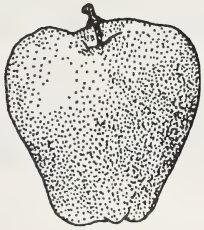
   b. $8\overline{)\,11.04}$ $\quad 1.38$

   c. $21\overline{)\,45.12}$ $\quad 37.60$

   d. $35\overline{)\,2.625}$ $\quad 0.75$

Space for Your Work

7. One dozen apples costs $3.96. What is the cost of one apple?



8. Megan raked a large lawn for $9.00. She worked for 2.25 hours. How much did she receive for one hour's work?

See your learning facilitator to check your answers and to receive further instructions.

Working Together

When you are dividing, you can express the answer as a whole number and a remainder, or as a whole number and a decimal number.

Example What is 19 ÷ 2?

Solution

$$\begin{array}{r} 9 \text{ R1} \\ 2\overline{)\,19} \\ \underline{18} \\ 1 \end{array} \qquad \begin{array}{r} 9.5 \\ 2\overline{)\,19.0} \\ \underline{18} \\ 10 \\ \underline{10} \end{array}$$

When you divide using a calculator you always get a decimal number answer when there is a remainder.

Key Press	Display
1 9 ÷ 2 =	9.5

How do you use a calculator to express the answer as a whole number and a remainder? Some extra steps are needed.

Since the decimal number part was obtained by dividing the remainder by the divisor, you must undo this by doing the opposite operation. In other words you must isolate the decimal number part and then multiply the decimal number part of the answer by the divisor.

Key Press	Display
1 9 ÷ 2 =	9.5
− 9 =	0.5
× 2 =	1

So 19 ÷ 2 = 9 R1.

Concluding Activities

Space for Your Work

Use a calculator to find the whole number and remainder answers for each of the following. The first one is done as an example.

1. Use a calculator to find the whole number and remainder answers for the following. The first one is done as an example.

   a. 81 ÷ 5

1. a.

Key Press	Display
8 1 ÷ 5 =	16.2
− 1 6 =	0.2
× 5 =	1

The whole number and remainder answer is 16 R1.

   b. 127 ÷ 2

Space for Your Work

c. 37 ÷ 4

d. 365 ÷ 8

Space for Your Work

2. Alice has 15 297 nickels. She wants to put the nickels into rolls of 40.

   a. How many rolls will she have?
   Express the answer as a decimal number.

   b. How many full rolls will she have?

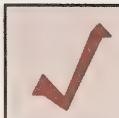
   c. How many nickels will be left over?

3. The Jacob family is packing 3200 containers of honey into cases. 24 containers are put in each case.

   a. How many cases do they pack?
   Express the answer as a decimal number.

   b. How many full cases do they pack?

   c. How many containers are left over?



See your learning facilitator to check your answers and to receive further instructions.

DIVIDING BY A DECIMAL NUMBER

What Lies Ahead

In this section you will learn how to divide a decimal number by a decimal number.

Working Together

In this section you will be learning about dividing by a decimal number.

Learning Aids Activities

You will begin by using base 10 blocks.

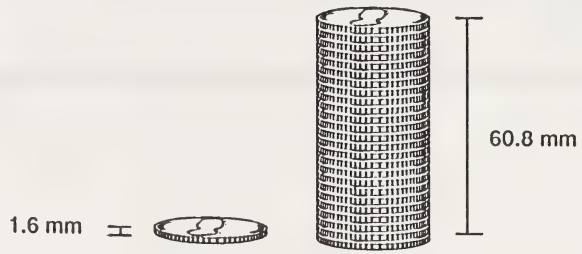
Turn to Exercise O in the *Learning Aids Booklet*.

Working Together

Now that you understand what division by a decimal number means, you are ready to estimate and calculate quotients.

Example 1

How many quarters are in the stack? See the picture below.



Solution

Estimate

Use friendly numbers to estimate.

60.8 ÷ 1.6 is about 60 ÷ 2 or 30.

There is about 30 quarters in the stack.

Calculate

60.8 ÷ 1.6 is equivalent to 608 ÷ 16.

Both 60.8 and 1.6 are multiplied by 10.

$$\begin{array}{r} 38 \\ 16\overline{)\,608} \\ \underline{48} \\ 128 \\ \underline{128} \\ 0 \end{array}$$

608 ÷ 16 = 38

Therefore, 60.8 ÷ 1.6 = 38

The quotient is reasonable since it is close to the estimate.

There are 38 quarters in the stack.

Example 2

Estimate and find the exact quotient for 13 ÷ 0.4.

Solution

Estimate

0.4 is about 0.5 or $\frac{1}{2}$.
1 ÷ 0.5 = 2 since there are 2 halves in 1.
Therefore, 13 ÷ 0.5 = 26.

13 ÷ 0.4 is about 26.

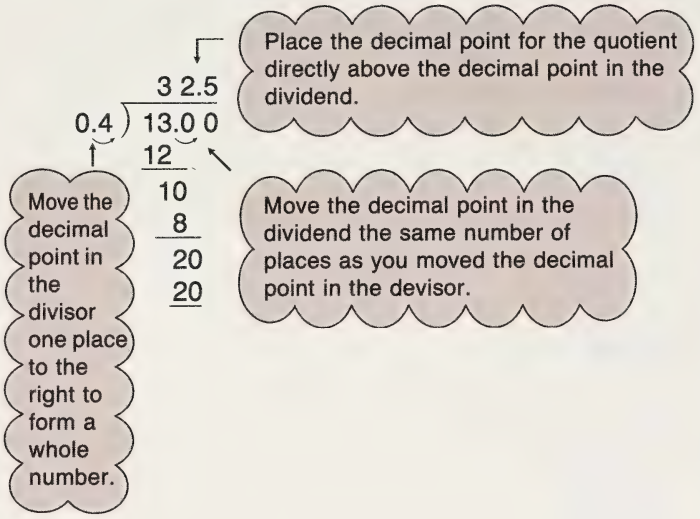
Calculate

13 ÷ 0.4 = 130 ÷ 4 ← Both 13 and 0.4 are multiplied by 10.

```
   32.5
4 ) 130.0
    12
    10
     8
    20
    20
```

← A zero is added to the dividend in order to find the quotient.

Here is another way to show this.


Place the decimal point for the quotient directly above the decimal point in the dividend.
3 2.5
0.4) 13.0 0
12
10
8
20
20
Move the decimal point in the dividend the same number of places as you moved the decimal point in the devisor.
Move the decimal point in the divisor one place to the right to form a whole number.

Note: Sometimes a carat, ∧ , is used to mark the new decimal places.

$0.4_{\wedge}\overline{)\,13.0_{\wedge}}$

Practice Activities

Space for Your Work

Do not use a calculator for Questions 1 to 7.

1. Divide the following.

   a. 24 ÷ 24

   b. 24 ÷ 12

   c. 24 ÷ 8

   d. 24 ÷ 6

   e. 24 ÷ 4

   f. 24 ÷ 3

   g. 24 ÷ 2

   h. 24 ÷ 1

   i. 24 ÷ 0.5

   j. 24 ÷ 0.25

   k. 24 ÷ 0.1

   l. 24 ÷ 0.01

Space for Your Work

2. a. What pattern did you notice in Question 1? As the divisor decreased what happened to the quotient?

   b. What did you notice about the quotient when the divisor was less than 1? Compare the quotient and dividend.

3. Write the number of digits in the whole-number part of the quotient.

   a. $0.15\overline{)\,0.16}$

   b. $0.15\overline{)\,1.6}$

   c. $1.5\overline{)\,1.6}$

4. Place the decimal point in the quotient to make each statement true.

   a. $17.67 \div 46.5 = 38$

   b. $44.65 \div 1.9 = 235$

   c. $82.28 \div 6.05 = 136$

Computer Alternative

5. Do Lessons 18, 19, 20 of the "Decimal" disk from the package *Computer Drill and Instruction: Mathematics, Level D.* (*SRA*). Read the instructions on the folder before using the program. If you need help or have an error hold down the SHIFT key and press the ? key.

Print Alternative

6. Find the quotients.

   a. $3\overline{)15}$, $0.3\overline{)1.5}$, $0.03\overline{)0.15}$

   b. $12\overline{)63}$, $12\overline{)6.3}$, $12\overline{)0.63}$

   c. $20\overline{)67}$, $2.0\overline{)6.7}$, $0.2\overline{)0.67}$

   d. $15\overline{)465}$, $1.5\overline{)4.65}$, $0.15\overline{)4.65}$

Space for Your Work

Space for Your Work

7. Give an estimate for each of the following and then calculate the exact answer where possible. Round the quotient to the nearest hundredth.

   a. $8.67 \div 0.16$

   b. $14.07 \div 6.75$

   c. $\dfrac{3.15}{2.15}$

   d. $\dfrac{14.84}{0.072}$

Space for Your Work

8. Are the following quotients reasonable? Calculate those quotients that are not reasonable.

a. $2.5 \overline{)\ 47.5}$ $\quad 1.9$

b. $1.2 \overline{)\ 10.68}$ $\quad 8.9$

c. $0.9 \overline{)\ 63.9}$ $\quad 7.1$

d. $903 \overline{)\ 4063.5}$ $\quad 4.5$

Space for Your Work

9. A piece of wood 250 cm long is cut into pieces 12.5 cm long. How many pieces are there?

10. 2.8 kg of raisins are packed in 750 g or 0.75 kg bags. How many bags are filled?

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See your learning facilitator to check your answers and to receive further instructions.

Working Together

"Target Decimals" is an interesting game.

The object of the game is to divide using a calculator and to reach the target range in as few steps as possible.

Example

Beginning Decimal

347.63

Target Range

4.9 - 5.0

	Key Press	Display	
Try 6.	3 4 7 . 6 3 ÷ 6 =	57.938333	← No, 57.938333 is not within the target range. It is over 10 times too big.
Try 60.	3 4 7 . 6 3 ÷ 6 0 =	5.7938333	← No, 5.7938333 is not within the target range. It is too big.
Try 70.	3 4 7 . 6 3 ÷ 7 0 =	4.9661428	← Yes, 4.9661428 is within the target range.

Concluding Activities

Space for Your Work

Play "Target Decimals."

Use the following target ranges and beginning decimals. Keep track of your calculator ranges.

	Beginning Decimal	Target Range
1.	5876.5	42.8 - 42.9
2.	100.8	2.1 - 2.2
3.	653.98	3.5 - 3.6

See your learning facilitator to check your answers and to receive further instructions.

What Lies Ahead

In this summary you will review these skills.

- interpreting place value of digits in a decimal number
- reading a decimal number
- writing a decimal number in standard form and in expanded form
- comparing and ordering decimal numbers
- rounding decimal numbers
- adding, subtracting, multiplying and dividing decimal numbers

Working Together

At this point, it would be a good idea to review the skills you have learned in Sections 12 - 19.

Turn to Section 12 and review the Pretest. Then correct any errors you may have made. You may be pleasantly surprised to discover how much you have learned!

MODULE CONCLUSION

What Lies Ahead

The Module Assignment in this Module Conclusion will evaluate achievement of the module objectives.

Working Together

Now that you have studied Module 3 and you have done the required practice, you are ready for the Module Assignment.

Module Assignment

Turn to the Module Assignment and complete the assignment independently. You may refer to your notes, but do not get help from anyone.

Afterwards submit the assignment for a grade and feedback from your teacher.

APPENDIX

GLOSSARY

Basic fraction: the form of the fraction that has the smallest numerator and denominator possible

$\frac{2}{3}$ is the basic fraction of $\frac{10}{15}$

Common denominator: a common multiple of two or more denominators

a common denominator for $\frac{1}{4}$ and $\frac{1}{6}$ is 12

Denominator: the bottom number in the fraction form of a number

$\frac{2}{5}$ ← denominator

Equivalent decimals: decimal numbers that name the same number

6.2, 6.20, 6.200 are equivalent decimals

Equivalent fractions: fractions that name the same number

$\frac{1}{3}, \frac{2}{6}, \frac{3}{9}, \frac{4}{12}$ are equivalent fractions

Expanded form: a form of a numeral written as the sum of the products of its digits and their place values

$(4 \times 1) + (1 \times 0.1) + (2 \times 0.01) + (3 \times 0.001)$ is the expanded form of 4.123

Fraction: numerals such as $\frac{1}{3}, \frac{4}{3}, 2\frac{1}{3}$

A fraction may represent a part of a whole, a part of a set, or a division.

Mixed number: a fraction greater than 1, which is expressed as a whole number and a fraction

$1\frac{1}{3}$ is a mixed number.

Numerator: the top number in the fraction form of a numeral

$\frac{2}{5}$ ← numerator

Place value: the value given to the place in which a digit appears in a numeral

In 4.123, the 2 appears in the hundredths place.

Proper fraction: a fraction whose numerator is less than its denominator

$\frac{2}{3}$ is a proper fraction

$\frac{5}{2}$ is not a proper fraction

Repeating decimal number: a decimal number in which a digit or a block of digits keeps repeating

$0.\dot{3} = 0.3333...$

$0.1\dot{8}\dot{2} = 0.1828282...$

$0.\dot{1}2\dot{3} = 0.123123123...$

Simplest form: a fraction whose numerator and denominator are the smallest whole numbers possible

The simplest form of $\frac{10}{15}$ is $\frac{2}{3}$.

Standard form: the usual form a numeral

3.128 is in standard form.

Terminating decimal: a decimal number with a known number of decimal places

0.125 is a terminating decimal. It has exactly 3 decimal places.

$0.1\dot{2}$ is not a terminating decimal.

0.121221222... is not a terminating decimal.

Improper fraction: a fraction whose numerator is larger than its denominator

$\frac{13}{5}$ is an improper fraction

$\frac{4}{11}$ is not an improper fraction

MULTIPLE BOARDS

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	46	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

FRACTION PUZZLE

1 $\frac{2}{4}$ $\frac{1}{7}$ $\frac{4}{12}$	$\frac{2}{10}$ 2 $\frac{8}{2}$ $\frac{1}{8}$	$\frac{7}{10}$ $\frac{3}{7}$	$\frac{1}{4}$ $\frac{2}{3}$
$\frac{2}{12}$ $\frac{3}{5}$	$\frac{8}{10}$ $\frac{5}{3}$ $\frac{6}{3}$ $\frac{3}{3}$	$\frac{2}{16}$ $\frac{2}{14}$ $\frac{3}{4}$ $\frac{5}{8}$	$\frac{1}{2}$ $\frac{1}{3}$
$\frac{10}{16}$ $\frac{6}{16}$ $\frac{2}{6}$	$\frac{8}{10}$ $\frac{6}{8}$ $\frac{12}{14}$	$\frac{10}{12}$ 0.7 0.2	$\frac{6}{14}$ $1\frac{1}{2}$ 0.3
$\frac{4}{6}$ $1\frac{2}{3}$ $\frac{0}{2}$	$\frac{2}{8}$ $\frac{5}{6}$ $\frac{4}{5}$	0 $\frac{1}{2}$ $\frac{1}{6}$	$\frac{1}{3}$ $\frac{6}{10}$ $\frac{3}{8}$

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